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This book demonstrates how imaging techniques, applying different frequency bands from the electromagnetic spectrum, are used in scientific research. Illustrated with numerous examples this book is structured according to the different radiation bands: From Gamma-rays over UV and IR to radio frequencies. In order to ensure a clear understanding of the processing methodologies, the text is enriched with descriptions of how digital images are formed, acquired, processed and how to extract information from them. A special emphasis is given to the application of imaging techniques in food and agriculture research.

Food materials are processed prior to their consumption using different processing technologies that improve their shelf life and maintain their physicochemical, biological, and sensory qualities. Introduction to Advanced Food Process Engineering provides a general reference on various aspects of processing, packaging, storage, and quality control

This book describes the various techniques for nondestructive quality assessment of fruits and vegetables. It covers the methods, measurements, operation principles, procedures, data analysis, and applications for implementing these techniques. The book presents the details of nondestructive approaches focusing on the present-day trends and existing future opportunities in the fresh food supply chain. First, it overviews different nondestructive techniques in food quality detection. Then it presents nondestructive methods: monochrome computer vision, imaging techniques, biospeckle laser technique, Fourier Transform Infrared (FTIR) Spectroscopy, hyperspectral imaging, Raman spec-

troscopy, near infrared (NIR) spectroscopy, X-ray computed tomography, ultrasound, acoustic emission, chemometrics, electronic nose and tongue. Selected applications of each method are also introduced. As a result, readers gain a better understanding of how to use nondestructive methods and technologies to detect the quality of fresh fruits and vegetables. With a wide range of interesting topics, the book will benefit readers including postharvest & food scientists/technologists, industry personnel and researchers involved in fresh produce quality detection. The book can also serve as a readily accessible reference material for postgraduate students.

From health and economic consequences to exposure assessment and detoxification, this reference comprehensively covers the formation, characteristics, and control of various toxins that occur in the production, storage, handling, and preparation of food. The author discusses toxin sources, mechanisms, routes of exposure and absorption, and their chemical and biochemical components to prevent contamination of food products and reduce epidemics of foodborne disease. The book contains more than 3000 references to facilitate further research, as well as recent guidelines from the FDA and World Health Organization regarding food hygiene and safety.

Over the past decade, new applications of genetic engineering in the fermentation of food products have received a great deal of coverage in scientific literature. While many books focus solely on recent developments, this reference book highlights these developments and provides detailed background and manufacturing information. Co-Edited by Fidel

Describing NDE issues associated with re-

al-world applications, this comprehensive book details conventional and forthcoming NDE technologies. It instructs on current practices, common techniques and equipment applications, and the potentials and limitations of current NDE methods. Each chapter details a different method, providing an overview, an e

FOOD CHEMISTRY A unique book detailing the impact of food adulteration, food toxicity and packaging on our nutritional balance, as well as presenting and analyzing technological advancements such as the uses of green solvents with sensors for non-destructive quality evaluation of food. Food Chemistry: The Role of Additives, Preservatives and Adulteration is designed to present basic information on the composition of foods and the chemical and physical changes that their characteristics undergo during processing, storage, and handling. Details concerning recent developments and insights into the future of food chemical risk analysis are presented, along with topics such as food chemistry, the role of additives, preservatives, and food adulteration, food safety objectives, risk assessment, quality assurance, and control. Moreover, good manufacturing practices, food processing systems, design and control, and rapid methods of analysis and detection are covered, as well as sensor technology, environmental control, and safety. The book also presents detailed information about the chemistry of each major class of food additive and their multiple functionalities. In addition, numerous recent findings are covered, along with an explanation of how their quality is ascertained and consumer safety ensured. Audience The core audience of this book include food technologists, food chemists, biochemists, biotechnologists, food, and beverage technologists, and nanoscien-

tists working in the field of food chemistry, food technology, and food and nanoscience. In addition, R&D experts, researchers in academia and industry working in food science/safety, and process engineers in industries will find this book extremely valuable.

Nondestructive evaluation (NDE) inspection schemes are important in design, manufacturing, and maintenance. By correctly applying techniques of NDE, we can reduce machine and system failures and increase reliability of operating systems over an extended lifetime. *Nondestructive Evaluation: A Tool in Design, Manufacturing, and Service* introduces and discusses primary techniques used in the field, including ultrasonics, acoustic emission, magnetics, radiography, penetrants, and eddy currents. Examples of each of these techniques are included, demonstrating typical applications.

The *Handbook of Research on Food Processing and Preservation Technologies* is a 5-volume collection that highlights various design, development, and applications of novel and innovative strategies for food processing and preservation. The roles and applications of minimal processing techniques (such as ozone treatment, vacuum drying, osmotic dehydration, dense phase carbon dioxide treatment, pulsed electric field, and high-pressure assisted freezing) are discussed, along with a wide range of other 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, *Volume 1: 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. *Volume 2: Nonthermal Food Preservation and Novel Processing Strategies* introduces several new food processing and preservation technologies that have been investigated by researchers and which have the poten-

tial to increase shelf life and preserve the quality of foods. It focuses 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. *Volume 3: Computer-Aided Food Processing and Quality Evaluation Techniques* presents a number of exciting applications of computer-aided techniques for quality evaluation and secure food quality. The chapter authors present emerging nonthermal approaches for food processing and preservation including detailed discussions on color measurement techniques, RFID, 3D-food printing, potential of robotics, artificial intelligence, terahertz spectroscopy imaging technique, instrumentation techniques and transducers, and more. *Volume 4: Design and Development of Specific Foods, Packaging Systems, and Food Safety* presents new research on health food formulation, advanced packaging systems, and toxicological studies for food safety. This book covers in detail the design of functional foods for beneficial gut microflora and microbiota; composite probiotic dairy products; encapsulation technology for development of specific foods; edible, biodegradable, and alternative food packaging technologies; ozonation in surface modification of food packaging polymers; characterization applications and safety aspects of nanomaterials used in food and dairy industry; and more. *Volume 5: Emerging Techniques for Food Processing, Quality, and Safety Assurance* discusses various emerging techniques for food preservation, formulation, and nondestructive quality evaluation techniques. Each chapter covers major aspects pertaining to principles, design, and applications of various food processing and nondestructive quality evaluation techniques, such as low-temperature-based ultrasonic drying, hypobaric processing, viability of high-pressure technology, pulsed electric fields in food preservation, green nanotechnology, advanced methods of encapsulation, the use of robotic engineering for quality and safety, and more. Together, the 5 volumes of the *Handbook of Research on Food Processing and Preservation Technologies* will prove to be valuable resource for researchers, scientists, students, growers, traders, processors, and others in the food processing industry.

Numerous works on non-destructive testing of food quality have been reported in the literature. Techniques such as Near InfraRed (NIR) spectroscopy, color and visual spectroscopy, electronic nose and tongue,

computer vision (image analysis), ultrasound, x-ray, CT and magnetic resonance imaging are some of the most applied for that purpose and are described in this book. Aspects such as theory/basics of the techniques, practical applications (sampling, experimentation, data analysis) for evaluation of quality attributes of food and some recent works reported in literature are presented and discussed. This book is particularly interesting for new researchers in food quality and serves as an updated state-of-the-art report for those already familiar with the field.

Computer Vision Technology for Food Quality Evaluation, Second Edition continues to be a valuable resource to engineers, researchers, and technologists in research and development, as well as a complete reference to students interested in this rapidly expanding field. This new edition highlights the most recent developments in imaging processing and analysis techniques and methodology, captures cutting-edge developments in computer vision technology, and pinpoints future trends in research and development for food quality and safety evaluation and control. It is a unique reference that provides a deep understanding of the issues of data acquisition and image analysis and offers techniques to solve problems and further develop efficient methods for food quality assessment. Thoroughly explains what computer vision technology is, what it can do, and how to apply it for food quality evaluation. Includes a wide variety of computer vision techniques and applications to evaluate a wide variety of foods. Describes the pros and cons of different techniques for quality evaluation.

This is the first textbook in this field of increasing importance for the food and cosmetics industries. It is indispensable for future students of food technology and food chemistry as well as for engineers, technologists and technicians in the food industries. It describes the principles of food physics starting with the very basics – and focuses on the needs of practitioners without omitting important basic principles. It will be indispensable for future students of food technology and food chemistry as well as for engineers, technologists and technicians in the food industries. *Food Physics* deals with the physical properties of food, food ingredients and their measurement.

Presents contemporary methods of measuring optical properties, moisture, ash content, and other physical characteristics of food and evaluates techniques used to trace nutrient analytes ranging from peptides, proteins, and enzymes to aroma

compounds to carbohydrates and starch. Evaluation Technologies for Food Quality summarizes food quality evaluation technologies, which include sensory evaluation techniques and chemical and physical analysis. In particular, the book introduces many novel micro and nano evaluation techniques, such as atomic force microscopy, scanning electron microscopy, and other nanomaterial-based methods. All topics cover basic principles, procedures, advantages, limitations, recent technology development, and application progress in different types of foods. This book is a valuable resource for scientists in the field of food science, engineering, and professionals in the food industry, as well as for undergraduate and postgraduate students studying food quality evaluation technology. Explains basic principles, procedures, advantages, limitations, and current applications of recent food quality technologies Provides guidance on the understanding and application of food quality evaluation technology in the field of food research and food industry Introduces many novel micro/nano evaluation techniques, such as atomic force and scanning electron microscopies and other nanomaterial-based methods

This two-volume handbook supplies food chemists with essential information on the physical and chemical properties of nutrients, descriptions of analytical techniques, and an assessment of their procedural reliability. The new edition includes two new chapters that spotlight the characterization of water activity and the analysis of inorganic nutrients, and provides authoritative rundowns of analytical techniques for the sensory evaluation of food, amino acids and fatty acids, neutral lipids and phospholipids, and more. The leading reference work on the analysis of food, this edition covers new topics and techniques and reflects the very latest data and methodological advances in all chapters.

The expert contributors to *Nondestructive Testing of Food Quality* clearly explain present industry advances and how to turn available instrumentation into valuable assets. Readers learn how the competencies of product knowledge, process understanding, instrumentation, principles of sensing, process control, and analytical methodology are required to turn an application into success. The broad-based coverage of topics addresses the most dominant sensor technologies keeping in mind the research initiatives advancing these technologies not only in food but also in the pharmaceutical sectors. Coverage includes: ultrasound, near infrared spectroscopy, mid-infrared spectroscopy, Raman spectroscopy, hyperspectral imaging systems, magnetic

resonance imaging, electronic nose, z-nose, biosensors, microwave absorption, and nanoparticles and colloids as sensors.

Discussing methods of enzyme purification, characterization, isolation, and identification, this book details the chemistry, behavior, and physicochemical properties of enzymes to control, enhance, or inhibit enzymatic activity for improved taste, texture, shelf-life, nutritional value, and process tolerance of foods and food products. The book cov

Thoroughly updated to accommodate recent research and state-of-the-art technologies impacting the field, Volume 2: Residues and Other Food Component Analysis of this celebrated 3 volume reference compiles modern methods for the detection of residues in foods from pesticides, herbicides, antibacterials, food packaging, and other sources. Volume 2 evaluates methods for: establishing the presence of mycotoxins and phycotoxins identifying growth promoters and residual antibacterials tracking residues left by fungicides and herbicides discerning carbamate and urea pesticide residues confirming residual amounts of organochlorine and organophosphate pesticides detecting dioxin, polychlorobiphenyl (PCB), and dioxin-like PCB residues ascertaining n-nitroso compounds and polycyclic aromatic hydrocarbons tracing metal contaminants in foodstuffs

This book comprehensively introduces non-destructive methods for food quality (i.e. external, internal, sensory, components, and microbiological indicators) detection, through optics, acoustics, chemistry, imaging, and bionic sensing. It highlights in-situ detection of food quality and safety, including principles, signal processing, and analysis of data, non-destructive detection system, and application in the food industry for each method. First, this book introduces the principles and characteristics of various food non-destructive methods. As non-destructive measurements always involve obtaining big data for each testing, this book also describes in detail the signal and big data processing for each non-destructive method. The chapters also introduce the rapid portable detection equipment for food and agricultural products developed in recent years, as well as the intelligent monitoring equipment in the process of food processing. Relevant application cases are provided to help readers better understanding how to apply non-destructive technology for food quality detection. In the noninvasive measurement of food quality, this book has a systematic introduction of the detection principle, data processing, and rapid detec-

tion system, in-field detection case studies. This book is novel and practical and can be used as a professional textbook for undergraduates majoring in food science and engineering. It can also be used as a reference book for scientific research and technical personnel engaged in the field of food quality and safety detection.

This volume illustrates significant changes in optical, magnetic, ultrasonic, mechanical and biological nondestructive evaluation techniques for online automatic control of food quality evaluation, including X-ray tomography. It presents advances in computer vision, X-ray imaging, ultrasonics, biosensors, and data analysis.

The ultimate goal of crop production is to provide quality produce to consumers at reasonable rates. Most fresh produce is highly perishable, and postharvest losses are significant under the present methods of management in many countries. However, significant achievements have been made during the last few years to curtail postharvest losses in fr

This book presents a comprehensive study of the handling of fresh fruits in the developing world from harvesting to the shelf. With annual losses ranging from 30-40% due to lack of knowledge on proper handling practices and value addition, this book's information on postharvest handling and quality testing is crucial for reducing these losses and improving the quality and safety of fresh fruits in these areas. With its added focus on marketing and organized retail aspects, *Postharvest Quality Assurance of Fruits: Practical Approaches for Developing Countries* covers the entire range of fruit handling, from transportation and packaging to quality assessment and commercial preparation. In presenting a fully comprehensive outline of the factors affecting postharvest quality and marketability of fruits, this work lays the foundation for understanding the proper storage, transportation and packaging methods to prevent losses and increase quality. With its study of prevailing marketing systems, supply chains and retail methods, the book presents the complete picture for the postharvest handling of fruits in the developing world.

The book consists of 19 chapters on different subjects and in different dimensions, with particular emphasis on the post-harvest handling and processing of fruits and vegetables, including mushrooms. Scope for the technology on fruits and vegetables, non-destructive methods to evaluate fresh quality, radiation preservation, chemistry of pectin and pigments and their applications, nutraceutical compounds, mem-

brane processing of liquid fruits, dehydrated and intermediate moisture products, importance of bamboo and mushrooms as food, influence of process conditions on product quality, food additives in product preparation, packaging aspects, microbiological safety concerns, relevant analytical methods, mushroom nutraceuticals and bio-technological interventions for improvement of banana with a final note on conclusions in the last

Edited by a leading authority on quality issues, and with a distinguished international team of contributors, this major new book summarizes important new research on improving quality in fish processing.

Meat Quality Analysis: Advanced Evaluation Methods, Techniques, and Technologies takes a modern approach to identify a compositional and nutritional analysis of meat and meat products, post-mortem aging methods, proteome analysis for optimization of the aging process, lipid profiles, including lipid mediated oxidations, meat authentication and traceability, strategies and detection techniques of potential food-borne pathogens, pesticide and drug residues, including antimicrobial growth promoters, food preservatives and additives, and sensory evaluation techniques. This practical reference will be extremely useful to researchers and scientists working in the meat industry, but will also be valuable to students entering fields of meat science, quality and safety. Presents focused detection techniques for reducing or eliminating foodborne pathogens from meat Includes strategies and methods on how to better understand meat authenticity and traceability, including meat speciation Provides tables, figures and illustrations to facilitate a better understanding of techniques and methods

With rapid progress being made in both theory and practical applications, Artificial Intelligence (AI) is transforming every aspect of life and leading the world towards a sustainable future. AI technology is fundamentally and radically affecting agriculture with a move towards smart systems. The outcome of this transition is improved efficiency, reduced environmental pollution, and enhanced productivity of crops. **Nondestructive Evaluation of Agro-products by Intelligent Sensing Techniques** is a reference which provides readers timely updates in the progress of intelligent sensing techniques used for nondestructive evaluation of agro-products. Chapters, each contributed by experts in food safety and technology, describe existing and innovative techniques that could be or have been applied to agro-products quality and

safety evaluation, processing, harvest, traceability, and so on. The book includes 11 individual chapters, with each chapter focusing on a specific aspect of intelligent sensing techniques applied in agriculture. Specifically, the first chapter introduces the reader to representative techniques and methods for nondestructive evaluation. Subsequent chapters present detailed information about the processing and quality evaluation of agro-products (e.g., fruits, and vegetables), food grading, food tracing, and the use of robots for harvesting specialty crops. **Key Features:** - 11 chapters, contributed by experts that cover basic and applied research in agriculture - introduces readers to nondestructive evaluation techniques - covers food quality evaluation processes - covers food grading and traceability systems - covers frontier topics that represent future trends (robots and UAVs used in agriculture) - familiarizes the readers with several intelligent sensing technologies used in the agricultural sector (including machine vision, near-infrared spectroscopy, hyperspectral/multispectral imaging, bio-sensing, multi-technology fusion detection) - provides bibliographic references for further reading - gives applied examples on both common and specialty crops This reference is intended as a source of updated information for consultants, students and academicians involved in agriculture, crops science and food biotechnology. Professionals involved in food safety and security planning and policymaking will also benefit from the information presented by the authors.

NOVEL TECHNOLOGIES IN FOOD SCIENCE Presenting cutting-edge information on new and emerging food engineering processes, **Novel Technologies in Food Science**, the newest volume in the groundbreaking new series, "Bioprocessing in Food Science," is an essential reference on the modelling, quality, safety, and technologies associated with food processing operations today. **Novel Technologies in Food Science**, the latest volume in the series, "Bioprocessing in Food Science," is based on the novel technologies in usage and requirements for handling, processing, storage, and packaging of food. Novel bioprocessing technologies are gaining more interest among researchers and industries due to the minimal impact on product quality in comparison to conventional methods. These techniques are also superior in terms of energy, time-saving and extended shelf life, and thus can replace the conventional technologies partially or completely. Practical application of these technologies by the food industry, however, is limited due to higher costs, lack of knowledge in food manufacturers for the imple-

mentation of technologies, and validation systems. An in-depth discussion on consumer needs and rights, industry responsibilities, and future prospectus of novel technologies in food science are covered in this volume. The main objective of this book is to disseminate knowledge about the recent technologies developed in the field of food science to students, researchers, and industry people. This will enable them to make crucial decisions regarding the adoption, implementation, economics, and constraints of the different technologies. Different technologies like ultrasonication, pulse electric field, high-pressure processing, magnetization, ohmic heating, and irradiation are discussed with their application in food product manufacturing, packaging, food safety, and quality assurance. Whether for the veteran engineer or scientist, the student, or a manager or other technician working in the field, this volume is a must-have for any library.

Now in two volumes and containing more than seventy chapters, the second edition of **Fruit and Vegetable Phytochemicals: Chemistry, Nutritional Value and Stability** has been greatly revised and expanded. Written by hundreds of experts from across the world, the chapters cover diverse aspects of chemistry and biological functions, the influence of postharvest technologies, analysis methods and important phytochemicals in more than thirty fruits and vegetables. Providing readers with a comprehensive and cutting-edge description of the metabolism and molecular mechanisms associated with the beneficial effects of phytochemicals for human health, this is the perfect resource not only for students and teachers but also researchers, physicians and the public in general.

With rapid progress being made in both theory and practical applications, Artificial Intelligence (AI) is transforming every aspect of life and leading the world towards a sustainable future. AI technology is fundamentally and radically affecting agriculture with a move towards smart systems. The outcome of this transition is improved efficiency, reduced environmental pollution, and enhanced productivity of crops. **Nondestructive Evaluation of Agro-products by Intelligent Sensing Techniques** is a reference which provides readers timely updates in the progress of intelligent sensing techniques used for nondestructive evaluation of agro-products. Chapters, each contributed by experts in food safety and technology, describe existing and innovative techniques that could be or have been applied to agro-products quality and safety evaluation, processing, harvest,

traceability, and so on. The book includes 11 individual chapters, with each chapter focusing on a specific aspect of intelligent sensing techniques applied in agriculture. Specifically, the first chapter introduces the reader to representative techniques and methods for nondestructive evaluation. Subsequent chapters present detailed information about the processing and quality evaluation of agro-products (e.g., fruits, and vegetables), food grading, food tracing, and the use of robots for harvesting specialty crops. Key Features: - 11 chapters, contributed by experts that cover basic and applied research in agriculture- introduces readers to nondestructive evaluation techniques- covers food quality evaluation processes- covers food grading and traceability systems- covers frontier topics that represent future trends (robots and UAVs used in agriculture)- familiarizes the readers with several intelligent sensing technologies used in the agricultural sector (including machine vision, near-infrared spectroscopy, hyperspectral/multispectral imaging, bio-sensing, multi-technology fusion detection)- provides bibliographic references for further reading- gives applied examples on both common and specialty crops This reference is intended as a source of updated information for consultants, students and academicians involved in agriculture, crops science and food biotechnology. Professionals involved in food safety and security planning and policymaking will also benefit from the information presented by the authors

The ability to trace and authenticate a food product is of major concern to the food industry. This important topic is reviewed extensively in this authoritative text on current and emerging techniques. Part one deals with analytical techniques applied to food authentication. There are chapters on both established and developing technologies, as well as discussions of chemometrics and data handling. Part two relates these methodologies to particular food and beverage products, such as meat, dairy products, cereals and wine. In part three traceability is reviewed in detail, looking at the development of efficient traceability systems and their application in practice to such areas as animal feed and fish processing. Food Authenticity and Traceability is an essential reference for all those concerned with food safety and quality. Outlines methods and issues in food authentication and traceability Deals with analytical techniques applied to food authentication, with chapters on established and developing technologies, chemometrics and data handling Explores how techniques are applied in particular sectors and reviews recent developments in trace-

ability systems for differing food products

Modern Techniques for Food Authentication, Second Edition presents a comprehensive review of the novel techniques available to authenticate food products, including various spectroscopic technologies, methods based on isotopic analysis and chromatography, and other techniques based on DNA, enzymatic analysis and electrophoresis. This new edition pinpoints research and development trends for those working in research, development and operations in the food industry, giving them readily accessible information on modern food authentication techniques to ensure a safe and authentic food supply. It will also serve as an essential reference source to undergraduate and postgraduate students, and for researchers in universities and research institutions. Presents emerging imaging techniques that have proven to be powerful, non-destructive tools for food authentication Includes applications of hyperspectral imaging to reflect the current trend of developments in food imaging technology for each topic area Provides pixel level visualization techniques needed for fast and effective food sample testing Contains two new chapters on Imaging Spectroscopic Techniques

Modifying Food Texture, Volume 2: Sensory Analysis, Consumer Requirements and Preferences explores texture as an important aspect of consumer food acceptance and preference, specifically addressing the food textural needs of infants, the elderly, and dysphagia patients. This volume covers the sensory analysis of texture-modified foods, taking an in-depth look at the product development needs of consumers and exploring the sensory analysis of food texture and the development of texture-modified foods. Explores texture as an important aspect of consumer food acceptance and preference Addresses the food textural needs of special groups, including infants, the elderly, and dysphagia patients Takes an in-depth look at the product development needs of consumers, exploring the sensory analysis of food texture

This book constitutes the thoroughly refereed post-conference proceedings of the Third IFIP TC 12 International Conference on Computer and Computing Technologies in Agriculture, CCTA 2009, held in Beijing, China, in October 2009. The 80 revised papers were carefully selected from numerous submissions. The papers cover a wide range of interesting theories and applications of information technology in agriculture, including simulation models and decision-support systems for agricultural production, agricultural product quality test-

ing, traceability and e-commerce technology, the application of information and communication technology in agriculture and universal information service technology, and service systems development in rural areas.

Hui, a technology consultant, presents material on frozen food science, technology, and engineering, describing the manufacture, processing, inspection, and safety of frozen foods. He outlines basic procedures for optimizing the quality and texture of frozen foods and includes and tables and examples that illustrate the effects of various chemical and biochemical reactions on the quality of frozen food. The book details methods for selecting the most appropriate packaging materials for frozen foods, and provides guidelines on ensuring product safety.

Many measurements of product and process characteristics have traditionally been 'off-line', involving removing the product and taking it to a quality control laboratory for analysis over a period of hours or even days. However, the development of faster, more automated methods of production, and the shift to more proactive quality and safety management systems such as HACCP, has forced the food industry to look for more rapid methods with the potential for continuous, real-time measurement of products and processes. With its distinguished editor and international team of contributors, this important collection summarises key developments in this growing field. Part one reviews the emergence of new methods for analysing food safety. It includes chapters on the detection of foreign bodies, other contaminants such as toxins, pesticides, dioxins and veterinary residues, and rapid methods for detecting pathogenic and spoilage bacteria. Part two discusses the measurement of product quality. There are chapters on analysing ingredients such as additives and micronutrients, genetically-modified organisms and added water. A number of chapters discuss methods for analysing food composition, and the use of electronic noses to monitor food quality. A final chapter reviews ways of integrating such measurements into effective process control. Rapid and on-line instrumentation for food quality assurance provides a benchmark of good practice in this important field, and will be a valuable reference for the food industry. Summarises key developments in the growing field of food quality assurance, focussing on rapid and on-line instrumentation Includes chapters on the detection of foreign bodies, pathogenic and spoilage bacteria and other contaminants such as toxins, pesticides, dioxins and veterinary residues Discusses the mea-

surement of product quality and analyses ingredients such as additives and micronutrients, genetically-modified organisms and added water

Cheese Rheology and Texture is the first reference to bring together the essential information on the rheological and textural properties of cheese and state-of-the-art measurement techniques. This comprehensive resource begins with an overview of cheesemaking technology and detailed descriptions of fundamental rheological test methods. Then it presents uniaxial testing and fracture mechanics, the theory and applications of linear viscoelastic methods (dynamic testing), and the nonlinear viscoelasticity of cheeses. The book focuses on mechanics in its examination of cheese texture, while it emphasizes measurement methods in its discussion of cheese meltability and stretchability. Finally it addresses the effects of various factors, such as the properties of milk, cheesemaking procedures, and post-manufacturing processes, on the functional properties of cheese. Summarizing the vast literature available on the subject, Cheese Rheology and Texture helps those in the dairy industry and in academia choose the proper technique to measure properties that directly relate to food applications and ensure that cheese in their formulations will function

as intended.

The Handbook of Research on Food Processing and Preservation Technologies covers a vast abundance of information on various design, development, and applications of novel and innovative strategies for food processing and preservation. The roles and applications of minimal processing techniques (such as ozone treatment, vacuum drying, osmotic dehydration, dense phase carbon dioxide treatment, pulsed electric field, and high-pressure assisted freezing) are 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. Volume 5: Emerging Techniques for Food Processing, Quality, and Safety Assurance discusses various emerging techniques for food preserva-

tion, formulation, and nondestructive quality evaluation techniques. Each chapter covers major aspects pertaining to principles, design, and applications of various food processing methods, such as low temperature-based-ultrasonic drying of foods, hypobaric processing of foods, viability of high-pressure technology, application of pulsed electric fields in food preservation, green nanotechnology for food processing and preservation, advanced methods of encapsulation, basics and methods of food authentication, imaging techniques for quality inspection of spices and nuts, FTIR coupled with chemometrics for food quality and safety, and the use of robotic engineering for quality and safety. Other volumes in the 5-volume set include: Volume 1: Nonthermal and Innovative Food Processing Methods Volume 2: Nonthermal Food Preservation and Novel Processing Strategies Volume 3: Computer-Aided Food Processing and Quality Evaluation Techniques Volume 4: Design and Development of Specific Foods, Packaging Systems, and Food Safety Together with the other volumes in the set, the Handbook of Research on Food Processing and Preservation Technologies will be a valuable resource for researchers, scientists, students, growers, traders, processors, industries, and others.