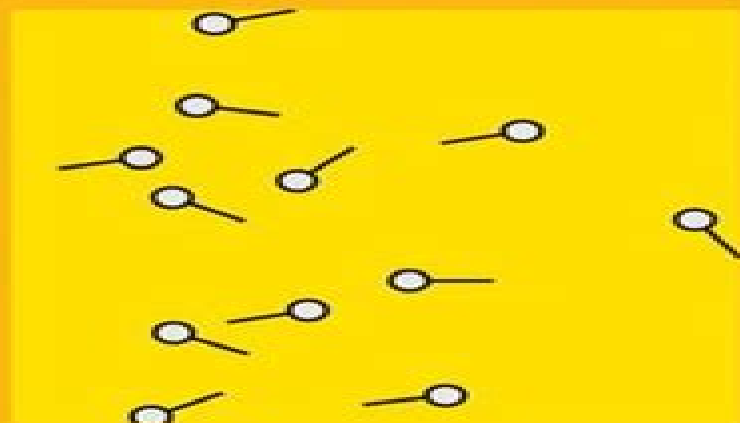
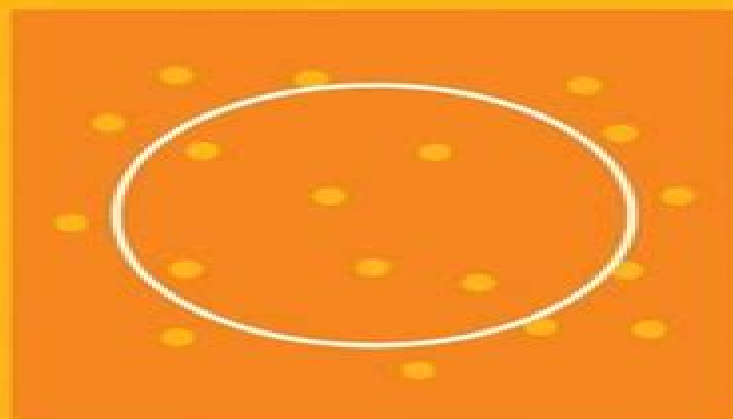


# Nano- and Microencapsulation for Foods

EDITED BY HAE-SOO KWAK



WILEY Blackwell

# Nano And Microencapsulation For Foods

**Seid Mahdi Jafari**



## **Nano And Microencapsulation For Foods:**

**Nano- and Microencapsulation for Foods** Hae-Soo Kwak, 2014-04-02 Today nano and microencapsulation are increasingly being utilized in the pharmaceutical textile agricultural and food industries Microencapsulation is a process in which tiny particles or droplets of a food are surrounded by a coating to give small capsules These capsules can be imagined as tiny uniform spheres in which the particles at the core are protected from outside elements by the protective coating For example vitamins can be encapsulated to protect them from the deterioration they would undergo if they were exposed to oxygen This book highlights the principles applications toxicity and regulation of nano and microencapsulated foods Section I describes the theories and concepts of nano and microencapsulation for foods adapted from pharmaceutical areas rationales and new strategies of encapsulation and protection and controlled release of food ingredients Section II looks closely at the nano and microencapsulation of food ingredients such as vitamins minerals phytochemical lipid probiotics and flavors This section provides a variety of references for functional food ingredients with various technologies of nano particles and microencapsulation This section will be helpful to food processors and will deal with food ingredients for making newly developed functional food products Section III covers the application of encapsulated ingredients to various foods such as milk and dairy products beverages bakery and confectionery products and related food packaging materials Section IV touches on other related issues in nano and microencapsulation such as bioavailability bioactivity potential toxicity and regulation

**Application of Nano/Microencapsulated Ingredients in Food Products** ,2020-10-17 Application of Nano Microencapsulated Ingredients in Food Products a volume in the Nanoencapsulation in the Food Industry series presents applications of nano micro encapsulated ingredients such as vitamins minerals flavors colorants enzymes probiotics antioxidants and many other bioactive components in different groups of food products Each chapter explores nano microencapsulated ingredients in food products including beverages cereal flours and bakery products meat oils and fats salt spices and seasonings functional supplements and in chewing gum In addition the book explores active food packaging and edible coatings with nano microencapsulated ingredients Authored by a team of global experts in the fields of nano and microencapsulation of food nutraceutical and pharmaceutical ingredients this title is of great value to those engaged in the various fields of nanoencapsulation Clarifies which nanoencapsulated ingredients can be applied for different food products Thoroughly explores the influence of nanoencapsulated ingredients on the qualitative properties of different food products

**Nano- and Microencapsulation** Nedal Abu-Thabit, 2021-01-27 Nano or micro encapsulation is used in many different fields and industries including pharmaceuticals cosmetics food and agrochemicals It offers advantages for various applications especially drug delivery Nano encapsulation can help extend and control the release of drugs as well as increase drug bioavailability and efficacy It improves the precision of targeted drug delivery and allows for fabricating nano encapsulated drugs for diagnostic and theranaostic applications This book covers recent advances in fabricating nano micro

capsules using natural carriers for therapeutic and diagnostic drug delivery applications as well as rheology and formulations of micro emulsions for diverse applications This book is essential for scientists and researchers with diverse backgrounds in chemistry engineering material sciences pharmaceuticals and drug delivery

**Lipid-Based Nanostructures for Food Encapsulation Purposes** ,2019-08-03 Lipid Based Nanostructures for Food Encapsulation Purposes Volume Two in the

Nanoencapsulation in the Food Industry series reviews recent studies on the formulation and evaluation of different categories of lipid based nano carriers and discusses how lipid nanoencapsulation is a feasible technology for the food industry This book covers nano emulsions nano liposomes nanostructured lipid carriers and surfactant nanoparticles Authored by a team of global experts in the fields of nano and microencapsulation of food nutraceutical and pharmaceutical ingredients this title is of great value to those engaged in the various fields of nanoencapsulation Provides recent studies on the formulation and evaluation of different categories of lipid based nanocarriers Discusses how technology of lipid nanoencapsulation can be used in industries Summarizes the practical application of nanostructures from lipid formulations such as nanoemulsions nanoliposomes and nanostructured lipid carriers

**Novel Approaches of Nanotechnology in Food** Alexandru Grumezescu,2016-05-13 Novel Approaches of Nanotechnology in Food a volume in the Nanotechnology in the Agri Food Industry series represents a summary of the most recent advances made in the field of nanostructured materials that have significant impact on the agri food industry Because the current food market needs innovation nanotechnology coupled with novel interdisciplinary approaches and processing methods has enabled important advances that have the potential to revolutionize agri food sector Nanotechnology can serve to resolve challenges faced by the food and bioprocessing industries for developing and implementing systems that can produce qualitative and quantitative foods that are safe sustainable and ecofriendly This book is a valuable resource for scientists researchers and engineers in food science and biotechnology fields as well as students who want information on cutting edge technologies Provides worldwide research applications of nanomaterials and nanotechnology useful in food research Presents analytical methods for enzyme immobilization onto magnetic nanoparticles Includes strategies of behavior and structure function to increase application enhancement and control Discusses nanomaterial regulations and for consumer protection awareness

**Emerging Nanotechnologies in Food Science** Rosa Busquets,2017-02-28 Emerging Nanotechnologies in Food Science presents the current knowledge and latest developments in food nanotechnology taking a multidisciplinary approach to provide a broad and comprehensive understanding of the field Food nanotechnology is a newly emergent discipline that is fast growing and evolving The discipline continues to benefit from advances in materials and food sciences and has enormous scientific and economic potential The book presents nano ingredients and engineered nanoparticles developed to produce technologically improved food from both food science and engineering perspectives In addition subsequent chapters offer a review of recent outstanding inventions in food nanotechnology and legal considerations for the protection of intellectual property in this area

With its multidisciplinary team of contributors this book serves as a reference book for the ever growing food nanotechnology science Presents a multidisciplinary approach and broad perspective on nanotechnology applications in food science Contains contributors from various fields including chapters from a geochemist a tissue engineer and a microbiologist as well as several from food scientists Offers a range of insights relevant to different backgrounds Provides case studies in each chapter that demonstrate how nanotechnology is being used in today s food sector

**Characterization of Nanoencapsulated Food Ingredients** ,2020-03-07 Characterization of Nanoencapsulated Food Ingredients Volume Four in the Nanoencapsulation in the Food Industry series introduces some of the common instrumental analysis and characterization methods for the evaluation of nanocarriers and nanoencapsulated ingredients in terms of their morphology size distribution surface charge and composition appearance physicochemical and rheological properties and antioxidant activity Divided in five sections the book covers the qualitative and quantitative properties of nanoencapsulated food ingredients by different characterization techniques besides correlating nanocarrier behavior to their physicochemical and functional properties Authored by a team of global experts in the fields of nano and microencapsulation of food nutraceutical and pharmaceutical ingredients this title is of great value to those engaged in the various fields of nanoencapsulation and nanodelivery systems Shows how different properties of nanoencapsulated food ingredients can be analyzed Presents the mechanism of each characterization technique Investigates how the analytical results can be understood with nanoencapsulated ingredients

**Nanoencapsulation of Food Bioactive Ingredients** Seid Mahdi Jafari,2017-05-25 Nanoencapsulation of Food Bioactive Ingredients Principles and Applications brings different nanoencapsulated food bioactive ingredients their structure applications preparation formulations and encapsulation methodologies covering a wide range of compounds and giving detailed examples of the issues faced in their nano encapsulation The book addresses findings related to the study of natural food colorants vitamins antimicrobial agents phenolic compounds antioxidants flavors essential oils fish oil and essential fatty acids and other related ingredients As a definitive manual for researchers and industry personnel working or interested in various branches of encapsulation for food ingredients and nutraceutical purposes users will find this a great reference Explains different categories of nanoencapsulated food ingredients covering their applications nanoencapsulation techniques release mechanisms and characterization methods Addresses findings related to the study of natural food colorants vitamins antimicrobial agents phenolic compounds antioxidants flavors and essential oils Provides a deep understanding and potential of nanoencapsulated food ingredients as well as their novel applications in functional foods and nutraceutical systems

**Biopolymers in Nutraceuticals and Functional Foods** Sreerag Gopi,Preetha Balakrishnan,Matej Bračič,2022-11-04 As a result of their unique physical properties biological membrane mimetics such as biopolymers are used in a broad range of scientific and technological applications This comprehensive book covers new applications of biopolymers in the research and development of industrial scale

nutraceutical and functional food grade products All the major food biopolymers are included from plant animal and marine sources Coverage also includes biopolymer based drug delivery mechanisms intended for biological applications such as bio detection of pathogens fluorescent biological labels and drug and gene delivery This is the first interdisciplinary book to address this area specifically and is essential reading for those who produce the functional biopolymer materials as well as those who seek to incorporate them into appropriate nutraceutical food and drug delivery products Nanoencapsulation of Food Ingredients by Specialized Equipment ,2019-10-24 Nanoencapsulation of Food Ingredients by Specialized Equipment Third Edition a new volume in the Nanoencapsulation in the Food Industry series provides an overview of specialized developed equipment for the nanoencapsulation of food ingredients Electro spinning electro spraying nano spray dryer micro nano fluidics systems and sonication devices are just some of the equipment analyzed in the book Each chapter reviews the mechanisms of innovative devices for preparation of nanostructures exploring the key factors in each device to control the efficiency of nanoencapsulation and revealing the morphologies and properties of nanoencapsulated ingredients produced by each equipment Authored by a team of global experts in the fields of nano and microencapsulation of food nutraceutical and pharmaceutical ingredients this title is of great value to those engaged in the various fields of of nanoencapsulation Thoroughly explores the mechanisms of nanoencapsulation by specialized equipment Elucidates the key factors in each device to control the efficiency of nanoencapsulation Discusses the morphologies and properties of nanoencapsulated ingredients produced by each equipment **Food Applications of Nanotechnology** Gustavo Molina,Inamuddin,Franciele Maria Pelissari,Abdullah Mohamed Asiri,2019-08-29 Nanotechnology has developed remarkably in recent years and applied in the food industry has allowed new industrial advances the improvement of conventional technologies and the commercialization of products with new features and functionalities This progress offers the potential to increase productivity for producers food security for consumers and economic growth for industries Food Applications of Nanotechnology presents the main advances of nanotechnology for food industry development The fundamental concepts of the technique are presented followed by examples of application in several sectors such as the enhancement of flavor color and sensory characteristics the description of the general concepts of nano supplements antimicrobial nanoparticles and other active compounds into food and developments in the field of packaging among others In addition this work updates readers on the industrial development and the main regulatory aspects for the safety and commercialization of nanofoods Features Provides a general overview of nanotechnology in the food industry Discusses the current status of the production and use of nanomaterials as food additives Covers the technological developments in the areas of flavor color and sensory characteristics of food and food additives Reviews nanosupplements and how they provide improvements in nutritional functionality Explains the antibacterial properties of nanoparticles for food applications This book will serve food scientists and technologists food engineers chemists and innovators working in food or ingredient research and new product

development Gustavo Molina is associate professor at the UFVJM Diamantina Brazil in Food Engineering and head of the Laboratory of Food Biotechnology and conducts scientific and technical research His research interests are focused on industrial biotechnology Dr Inamuddin is currently working as assistant professor in the chemistry department of Faculty of Science King Abdulaziz University Jeddah Saudi Arabia He is also a permanent faculty member assistant professor at the Department of Applied Chemistry Aligarh Muslim University Aligarh India He has extensive research experience in multidisciplinary fields of analytical chemistry materials chemistry and electrochemistry and more specifically renewable energy and environment Prof Abdullah M Asiri is professor of organic photochemistry and has been the head of the chemistry department at King Abdulaziz University since October 2009 as well as the director of the Center of Excellence for Advanced Materials Research CEAMR since 2010 His research interest covers color chemistry synthesis of novel photochromic and thermochromic systems synthesis of novel coloring matters and dyeing of textiles materials chemistry nanochemistry and nanotechnology polymers and plastics Franciele Maria Pelissari graduated in Food Engineering earned her master s degree 2009 at the University of Londrina UEL Londrina Brazil and her PhD 2013 at the University of Campinas Unicamp Campinas Brazil Since 2013 she has been associate professor at the Institute of Science and Technology program at the Federal University of Jequitinhonha and Mucuri UFVJM Diamantina Brazil in Food Engineering and also full professor in the graduate program in Food Science and Technology

**Nanotechnology Applications in Food** Alexandru Grumezescu, Alexandra Elena Oprea, 2017-02-22 Nanotechnology Applications in Food Flavor Stability Nutrition and Safety is an up to date practical applications based reference that discusses the advantages and disadvantages of each application to help researchers scientists and bioengineers know what and what not to do to improve and facilitate the production of food ingredients and monitor food safety The book offers a broad spectrum of topics trending in the food industry such as pharmaceutical biomedical and antimicrobial approaches in food highlighting current concerns regarding safety regulations and the restricted use of nanomaterials Includes how nanobiosensors are useful for the detection of foodborne pathogens Discusses applications of nanotechnology from flavor and nutrition to stability and safety in packaging Includes nano and microencapsulation nanoemulsions nanosensors and nano delivery systems Identifies practical applications of nanoscience for use in industry today

New Polymers for Encapsulation of Nutraceutical Compounds Jorge Carlos Ruiz Ruiz, Maira Rubi Segura Campos, 2017-01-24 The incorporation of functional ingredients in a given food system and the processing and handling of such foods are associated with nutritional challenges for their healthy delivery The extreme sensitivity of some components cause significant loss of product quality stability nutritional value and bioavailability and the overall acceptability of the food product Consequently encapsulation has been successfully used to improve stability and bioavailability of functional ingredients Encapsulation is one example of technology that has the potential to meet the challenge of successfully incorporating and delivering functional ingredients into a range of food types The book will cover

topics about 1 Characterization of novel polymers and their use in encapsulation processes 2 Stability of nutraceutical compounds encapsulated with novel polymers 3 Application of encapsulated compounds with novel polymers in functional food systems This book provides a detailed overview of technologies for preparing and characterisation of encapsulates for food active ingredients using modified polymers The use of modified polymers as coating materials it is a field that still needs study The book is aimed to inform students and researchers in the areas of food science and food technology and professionals in the food industry      Advances in Processing Technologies for Bio-based Nanosystems in Food Óscar L. Ramos, Ricardo N. Pereira, Miguel A. Cerqueria, José A. Teixeira, António A. Vicente, 2019-07-25 Nanotechnology can be used to address challenges faced by the food and bioprocessing industries for developing and implementing improved or novel systems that can produce safer nutritious healthier sustainable and environmental friendly food products This book overviews the most recent advances made on the field of nanoscience and nanotechnology that significantly influenced the food industry Advances in Processing Technologies for Bio Based Nanosystems in Food provides a multidisciplinary review of the complex mechanisms involved in the research development production and legislation of food containing nanostructures systems Features Presents the most recent advances made in the field of nanoscience and nanotechnology as applied to the food industry Discusses innovative approaches and processing technologies Shows how nanotechnology can be used to produce safer nutritious healthier sustainable and environmental friendly food products Covers the complex mechanisms involved in the research development production and legislation of food containing nanostructures Selected examples of nanotechnology applications in food industry are shown focusing on advanced aspects of food packaging processing and preservation followed by one contribution that presents the potential commercialization and the main challenges for scale up Comprised of 15 chapters this book provides much needed and up to date information on the use of emergent technologies in bio based nanosystems for foods and serves as an ideal reference for scientists regulators industrialists and consumers that conduct research and development in the food processing industry      **Microencapsulation in the Food Industry** Robert Sobel, 2022-09-27 Microencapsulation in the Food Industry A Practical Implementation Guide Second Edition continues to focus on the development of new microencapsulation techniques for researchers and scientists in the field This practical reference combines the knowledge of new and novel processing techniques materials and selection regulatory aspects and testing and evaluation of materials It provides application specific uses of microencapsulation as it applies to the food and nutraceutical industries This reference offers unique solutions to some very specific product needs in the field of encapsulation This second edition highlights changes in the industry as a result of a field that has traversed from the micro scale level to nano scaled encapsulation and includes two new chapters one on regulatory quality process scale up packaging and economics and the other on testing and quality control Includes new characterization methodologies to understand chemical and physical properties for functionality of the final microencapsulated material Presents the latest research and



developments in the area of nano scale encapsulation and intelligent packaging Provides new testing tools to assess products containing microencapsulated actives      **Advances in Food Biotechnology** Ravishankar Rai V,2015-10-12 The application of biotechnology in the food sciences has led to an increase in food production and enhanced the quality and safety of food Food biotechnology is a dynamic field and the continual progress and advances have not only dealt effectively with issues related to food security but also augmented the nutritional and health aspects of food Advances in Food Biotechnology provides an overview of the latest development in food biotechnology as it relates to safety quality and security The seven sections of the book are multidisciplinary and cover the following topics GMOs and food security issues Applications of enzymes in food processing Fermentation technology Functional food and nutraceuticals Valorization of food waste Detection and control of foodborne pathogens Emerging techniques in food processing Bringing together experts drawn from around the world the book is a comprehensive reference in the most progressive field of food science and will be of interest to professionals scientists and academics in the food and biotech industries The book will be highly resourceful to governmental research and regulatory agencies and those who are studying and teaching food biotechnology      **Nanotechnology** Rakesh K. Sindhu,Mansi Chitkara,Inderjeet Singh Sandhu,2021-05-27 This book gives a summary of the rapidly growing field of nanotechnology and includes materials and technologies that help in developing particles of various sizes which can be utilized in different areas of research It discusses the role of nanotechnology in different aspects such as healthcare especially in target specific drug therapy for managing a number of medical disorders agriculture for developing smart field systems and food industry for improving and stabilizing the quality healthiness and shelf life of food Being multidisciplinary this book brings together the principles theory practices and applications of not only nanotechnology but also those of nanobiotechnology pharmaceuticals food packaging biosensors and electronic devices The book will be an exhilarating read for advanced undergraduate and graduate level students general readers interested in nanotechnology and researchers in chemistry biology and engineering The scope of the book extends from basic research in physics chemistry and biology including computational work and simulations through to the development of new devices and technologies for applications in a wide range of industrial sectors including information technology medicine manufacturing high performance materials and energy and environmental technologies It covers organic inorganic and hybrid materials and is an interdisciplinary book

**Release and Bioavailability of Nanoencapsulated Food Ingredients** ,2020-06-02 Release and Bioavailability of Nanoencapsulated Food Ingredients volume five in the Nanoencapsulation in the Food Industry series reviews different release mechanisms of nanoencapsulated food ingredients The book discusses mathematical and intelligent modeling of the release of bioactive agents from nano vehicles to better understand their release mechanisms while also covering different approaches for studying the release profile of these ingredients such as in vitro and in vivo assays Authored by a team of global experts in the fields of nano and microencapsulation of food nutraceutical and pharmaceutical ingredients this title

will be of great value to those engaged in various fields of nanoencapsulation Thoroughly explores the different release mechanisms of nanoencapsulated food ingredients Examines the release of bioactive ingredients by in vitro and in vivo systems Discusses different approaches for modeling the release data of nanoencapsulated ingredients      **Nanotechnology and Functional Foods** Cristina Sabliov,Hongda Chen,Rickey Yada,2015-04-21 The continued advancement in the sciences of functional foods and nutraceuticals has clearly established a strong correlation between consumption of bioactives and improved human health and performance However the efficacy and bioavailability of these bioactive ingredients e g omega 3 oils carotenoid antioxidants vitamins and probiotic bacteria in foods often remains a challenge due to their instability in food products and gastrointestinal tract as well as their limited bioavailability In some cases these bioactive ingredients may impart an undesirable organoleptic characteristic to the final product which hinders acceptance by consumers In addressing these challenges development of effective delivery systems is critical to meet the consumer needs for effective bioactives The scientific knowledge behind developing effective delivery of bioactive components into modern and wide ranging food products will be essential to reap their health promoting benefits and to support the sustained growth of the functional foods market Nanotechnology and Functional Foods Effective Delivery of Bioactive Ingredients explores the current data on all aspects of nanoscale packing carrying and delivery mechanisms of bioactives ingredients to functional foods The book presents various delivery systems including nano emulsions solid lipid nanoparticles and polymeric nano particles their properties and interactions with other food components and fate in the human body Later chapters emphasize the importance of consumers attitude towards nano delivery for the success of the technology and investigate the challenges faced by regulatory agencies to control risks and harmonize approaches worldwide The wide applicability of bioactive delivery systems with the purpose of improving food quality food safety and human health will make this book a worthy reference for a diverse range of readers in industry research and academia      **Nanotechnology and Nanomaterial Applications in Food, Health, and Biomedical Sciences** Deepak Kumar Verma,Megh R. Goya,Hafiz Anasr Rasul Suleria,2019-08-23 This new volume discusses the multitude of possibilities for new development in nanotechnology that focuses on overcoming the problems and challenges faced by the biomedical and food industries The volume hopes to facilitate the development of devices and materials that benefit patients and their healthcare The book is broken into three parts that cover nanotechnology techniques for biomedical applications nanoparticles and materials for food health and pharmaceutical application potential applications of nanotechnology in food safety

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