

# Preface

Dietary trends, nutritional recommendations and more stringent labeling regulations are placing increasing demands on the food industry. On the other hand, an understanding of food materials science and its impact on food processing and product development, and extending the understanding to nutrient delivery and gastric engineering for optimal performance in the gastrointestinal tract, provides significant new opportunities and challenges for food manufacturers. The interest in a broader food and health context at the interface of food science, food engineering, nutritional sciences, biological sciences, medicine and science in general has coincided with much research for mining and identification of numerous hydrophilic and lipophilic bioactive compounds. Food materials science has also been developed to a stage where food materials can be designed and produced to protect sensitive components, preserving their stability and controlled delivery in complex food products. Such rationally designed delivery systems must meet high safety and efficacy requirements and regulations, as well as economic viability criteria and consumer acceptance.

The present book introduces technologies and ways to engineer delivery systems for the stabilization of bioactive components in food ingredients and foods. The book also highlights and reminds readers about the importance of understanding physicochemical aspects of food stability at low water or low temperature conditions. Bioactive or nutraceutical components play a major role in the impact of food on health, but to ensure their optimal performance, food engineers and those involved in the development of processes and products must carefully consider extraction from raw materials, incorporation in foods, protection, stability during processing, shelf life and digestion, as well as release bioaccessibility and bioavailability in delivery. The present book discusses various topics, including *Recovery Technologies for Lipophilic Bioactives* (by C. Saldanha do Carmo, A.T. Serra, C.M.M. Duarte); *Recovery Technologies for Water-soluble Bioactives: Advances in Membrane-based Processes* (by Alfredo Cassano); *Industrial Production of Active Probiotics for Food Enrichment* (by Sai Swaroop Dalli, Bijaya K. Uprety and Sudip K. Rakshit); *Microencapsulation Technologies* (by M.A. Augustin and L. Sanguansri); *Nanoencapsulation Technologies*

(by Yoav D. Livney); *Encapsulation Efficiency and Capacity of Bioactive Delivery Systems* (by Sinéad B. Bleiel, Robert K. Kent and André Brodtkorb);  *$\beta$ -Lactoglobulin-Based Nano and Microparticulate Systems for the Protection and Delivery of Bioactives* (by Fatoumata Diarrassouba, Ghislain Garrait, Gabriel Remondetto and Muriel Subirade); *Crystallization* (by Nicolas Verhoeven, Tze Loon Neoh, Takeshi Furuta, and Hidefumi Yoshii); *Freezing and Freeze-drying* (by Yrjö H. Roos); *Spray Drying of Bioactives* (by Zhongxiang Fang and Bhesh Bhandari); *Protective Performance of Delivery Systems in Production, Shelf Life and Digestion* (by Stephan Drusch and R. Wilde); *Food Extrusion* (by Zeki Berk), *Non-thermal Stabilization Processes* (by Gustavo Barbosa-Cánovas); *Chemical Stability: Browning and Oxidation* (by Naritchaya Potes and Yrjö H. Roos); and *Improvement of Bioaccessibility and Bioavailability: From Molecular Interactions to Delivery Systems* (by Maarit J. Rein and Marcia da Silva Pinto). These chapters cover general properties of food systems and technologies available for long-term stabilization of food ingredients and foods as delivery systems.

Our book aims to provide students, researchers and food professionals in general with information and insights essential for the successful design, production and utilization of food as a vehicle for delivering health-promoting components, without compromising the pleasure of the culinary experience. The contents extend to bioaccessibility and bioavailability of compounds, which represents an expanding future area of gastronomic and nutritional engineering of foods.

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