

Contents

Part I Selected Topics in Food Engineering

- 1 The Beginning, Current, and Future of Food Engineering:
A Perspective** 3
Dennis R. Heldman and Daryl B. Lund
- 2 Advances in 3D Numerical Simulation of Viscous
and Viscoelastic Mixing Flows** 19
Kiran V. Vyakaranam and Jozef L. Kokini
- 3 CFD: An Innovative and Effective Design Tool
for the Food Industry** 45
Tomás Norton and Da-Wen Sun
- 4 Incorporation of Fibers in Foods: A Food Engineering Challenge ..** 69
Madhuvanti Kale, Dhananjay Pai, Bruce Hamaker,
and Osvaldo Campanella
- 5 Gastric Digestion of Foods: Mathematical Modeling of Flow
Field in a Human Stomach** 99
Samrendra Singh and R. Paul Singh
- 6 State of the Art in Immobilized/Encapsulated Cell Technology
in Fermentation Processes** 119
Viktor A. Nedović, Verica Manojlović, Branko Bugarski,
and Ronnie Willaert
- 7 Multifactorial Assessment of Microbial Risks in Foods: Merging
Engineering, Science, and Social Dimensions** 147
Valerie Davidson, Juliana Ruzante, and Carlos Daza Donoso

8 Development of Eco-efficiency Indicators to Assess the Environmental Performance of the Canadian Food and Beverage Industry	165
Michèle Marcotte, Yves Arcand, Dominique Maxime, and Denyse Landry	
9 Food Process Economics	219
George Saravacos and Zacharias Maroulis	
10 Systemic Approach to Curriculum Design and Development	237
Inés Ecima, Maurcio Pardo, and Gloria González-Mariño	

Part II Advances in Food Process Engineering

11 Innovations in Thermal Treatment of Food	247
Arthur Teixeira	
12 Optimization of Food Thermal Processing: Sterilization Stage and Plant Production Scheduling	261
Ricardo Simpson and Alik Abakarov	
13 Recent Advances in Emerging Nonthermal Technologies	285
Daniela Bermúdez-Aguirre and Gustavo V. Barbosa-Cánovas	
14 High-Pressure-Induced Effects on Bacterial Spores, Vegetative Microorganisms, and Enzymes	325
Dietrich Knorr, Kai Reineke, Alexander Mathys, Volker Heinz, and Roman Buckow	
15 High Pressure Sterilization of Foods	341
Hosahalli Ramaswamy	
16 Bioseparation of Nutraceuticals Using Supercritical Carbon Dioxide	353
Feral Temelli and Bernhard Seifried	
17 Mass Transfer and Equilibrium Parameters on High-Pressure CO₂ Extraction of Plant Essential Oils	393
José M. del Valle, Juan C. de la Fuente, Edgar Uquiche, Carsten Zetzl, and Gerd Brunner	

Contents

Part III Water Management in Food

- 18 Glass Transitions: Opportunities and Challenges** 473
Yrjö H. Roos and Nattiga Silalai
- 19 Caking of Water-Soluble Amorphous and Crystalline Food Powders** 491
Stefan Palzer and Karl Sommer
- 20 Effective Drying Zones and Nonlinear Dynamics in a Laboratory Spray Dryer** 515
Ulises Ramón Morales-Durán, Liliana Alamilla-Beltrán, Humberto Hernández-Sánchez, Jose Jorge Chanona-Pérez, Antonio Ruperto Jiménez-Aparicio, and Gustavo Fidel Gutiérrez-López
- 21 Rehydration Modeling of Food Particulates Utilizing Principles of Water Transport in Porous Media** 535
I. Sam Saguy, Oranit Troygot, Alejandro Marabi, and Rony Wallach
- 22 Responses of Living Organisms to Freezing and Drying: Potential Applications in Food Technology** 553
María del Pilar Buera

Part IV Food Microstructure

- 23 Food Microstructures for Health, Well-being, and Pleasure** 577
José Miguel Aguilera
- 24 Fruit Microstructure Evaluation Using Synchrotron X-Ray Computed Tomography** 589
Pieter Verboven, Quang Tri Ho, Els Herremans, Hibru Kelemu Mebatson, Bart Nicolaï, Greet Kerckhofs, Martine Wevers, and Peter Cloetens
- 25 Multifractal Characterization of Apple Pore and Ham Fat-Connective Tissue Size Distributions Using Image Analysis** 599
Fernando Mendoza, Nektarios Valous, Adriana Delgado, and Da-Wen Sun

Part V Food Packaging

- 26 New Packaging Materials Based on Renewable Resources: Properties, Applications, and Prospects** 619
Stéphane Guilbert, Carole Guillaume, and Nathalie Gontard

Contents

27 Edible Coatings to Improve Food Quality and Safety	631
Noemí Zaritzky	
28 Physical Properties of Edible Gelatin Films Colored with Chlorophyllide	661
Paulo J.A. Sobral, Rosemary A. Carvalho, and Carmen S. Fávaro-Trindade	
Index	679