PART I NEW TECHNOLOGIES FOR FUNCTIONAL FOOD MANUFACTURE.

1 Microencapsulation in functional food product development (Luz Sanguansri and Mary Ann Augustin).

1.1 Introduction.

1.2 Microencapsulation.

1.3 Microencapsulated food ingredients.

1.4 Development of microencapsulated ingredients.

1.5 Delivery of microencapsulated ingredient into functional foods.

1.6 Conclusion.

Acknowledgements.

References.


2.1 Introduction.

2.2 Brief history.

2.3 Structure and properties of cyclodextrins.

2.4 Formation and characterisation of the inclusion complexes.

2.5 Water adsorption isotherms.

2.6 Water and the stability and release of encapsulated nutraceuticals.

2.7 Applications and future prospects.

Acknowledgements.

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3 Supercritical carbon dioxide and subcritical water: Complementary agents in the processing of functional foods (Keerthi Srinivas and Jerry W. King).

3.1 Introduction.

3.2 Sub- and supercritical fluid solvents.
3.3 Sub- and supercritical fluid extraction.

3.4 Tandem processing using sub- and supercritical fluids.

3.5 Integrated critical fluid processing technology.

3.6 Production-scale critical fluid-based nutraceutical plants and commercial products.

References.


4.1 Introduction.

4.2 Food emulsions.

4.3 Delivery systems for bioactive materials.

4.4 Encapsulation of polyunsaturated fatty acids – an example application.

4.5 Conclusions.

References.

PART II FUNCTIONAL INGREDIENTS.

5 Functional and nutraceutical lipids (Fereidoon Shahidi).

5.1 Omega-3 fatty acids and products.

5.2 Monounsaturated fatty acids.

5.3 Medium-chain fatty acids and medium-chain triacylglycerols.

5.4 Conjugated linoleic acids and γ-linolenic acid.

5.5 Diacylglycerol oils.

5.6 Structured lipids.

5.7 Conclusions.

References.

6 The use of functional plant ingredients for the development of efficacious functional foods (Christopher P.F. Marinangeli and Peter J.H. Jones).

6.1 Introduction.
6.2 Soy extracts.

6.3 Plant sterols and stanols.

6.4 Fiber and its various components: β-Glucan and inulin.

6.5 Conclusions.

References.


7.1 Historical aspects.

7.2 Functional dairy product development.

7.3 Health and dairy functional ingredients.

7.4 Galacto-oligosaccharides, lactulose, lactitol and lactosucrose.

7.5 Growth factors.

7.6 Specific lipids.

7.7 The n-3 and n-6 polyunsaturated fatty acids.

7.8 Uses in food systems.

7.9 Regulations.

7.10 Future considerations.

References.

8 Probiotics and prebiotics (Anna Sip and Wlodzimierz Grajek).

8.1 Introduction.

8.2 Probiotic strains.

8.3 Functional properties of probiotics.

8.4 Medical applications.

8.5 Gastrointestinal infections of different etiology.

8.6 Colitis.

8.7 Functional bowel disorders.
8.8 Disorders in lipid metabolism.
8.9 Disorders of calcium and phosphate metabolism.
8.10 Food allergy.
8.11 Metabolic disorders.
8.12 Cancer.
8.13 Other disease entities.
8.14 Selection of probiotic strains.
8.15 Technological aspects and production of probiotic foods.
8.16 Probiotic products.
8.17 Prebiotics.
8.18 The application of prebiotics.
8.19 Synbiotics.
8.20 Conclusions.
References.

9 The influence of food processing and home cooking on the antioxidant stability in foods (Wlodzimierz Grajek and Anna Olejnik).

9.1 Introduction.
9.2 Mechanical processing.
9.3 Drying.
9.4 Conclusions.
References.


10.1 Introduction.
10.2 Industrial production of microalgal lipids.
10.3 Composition of algal biomass.
10.4 Characteristics of algal lipids.
10.5 Safety studies of algal lipids.
10.6 Applications.
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PART III PRODUCT DESIGN AND REGULATION.

11 New trends for food product design (Juan-Carlos Arboleya, Daniel Lasa, Idoia Olabarrieta and Iñigo Martínez de Marañón).

11.1 Introduction.
11.2 Functional food product design: Case studies.
11.3 Conclusions.
References.


12.1 What is reverse pharmacology?
12.2 Ayurveda’s strength for functional foods.
12.3 Framework for functional food development.
12.4 Case studies.
12.5 Factors to make reverse pharmacology work.
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13.1 Introduction.
13.2 The Canadian regulatory framework.
13.3 The United States regulatory framework.
13.4 The European Union’s regulatory framework.
13.5 The Japanese regulatory framework.

13.6 The Australian regulatory framework.

13.7 Conclusions on food regulation.

References.

PART IV FUNCTIONAL FOODS AND HEALTH.

14 Functional foods that boost the immune system (Calvin London).

14.1 The rise of immune-boosting functional foods.

14.2 Review of the immune system.

14.3 Immune-enhancing nutrients.


14.5 Fortified and modified food components.

14.6 Ancillary functional food components.

14.7 Functional immune-boosting animal feeds.

14.8 The future of immune-boosting functional foods.

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15.2 Food components in the Mediterranean diet.

15.3 Some health mechanisms of the Mediterranean diet.

15.4 Mediterranean diet and gastronomy.

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16.2 Evidence from intervention trials.
16.3 Challenges in fortification of foods for children.
16.4 Conclusions.

References.

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17.2 Phytosterol properties.
17.3 Efficacy of phytosterols.
17.4 Mechanism of action of phytosterols.
17.5 Safety of phytosterols.
17.6 Manufacturing of phytosterols.
17.7 Challenges in formulation, regulatory approval and commercialisation of phytosterol-containing foods.
17.8 Conclusion.

Acknowledgement.

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18.2 Prevalence of overweight and obesity.
18.3 Health costs related to obesity.
18.4 Etiology of obesity.
18.5 Obesity and cardiovascular disease.
18.6 Obesity and type 2 diabetes.
18.7 Prevention of obesity.
18.8 Treatment of obesity.
18.9 Natural products for obesity prevention and intervention.
18.10 Conclusion.

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19.2 The functions of omega-3, 6, 9 fatty acids in the brain and in the immune system.

19.3 Changes in concentrations and ratios of these fatty acids in neurodegenerative diseases.

19.4 The therapeutic effects in clinical investigations.

19.5 Mechanism by which EFAs treat different diseases.

19.6 Weakness of current treatments and researches, and the future research direction.

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20.2 Infant formulas.

20.3 Main bioactive compounds in breast milk and their use in infant formulas.

20.4 Conclusions.

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21.2 Bone is a dynamic tissue throughout the life cycle.

21.3 Assessment of bone health.

21.4 Foods and dietary components that may modulate bone metabolism throughout the life cycle.

21.5 Soy and its isoflavones.
21.6 Fish oil and \( n \)-3 long-chain polyunsaturated fatty acids.

21.7 Flaxseed and its components, secoisolariciresinol diglycoside and \( \alpha \)-linolenic acid.

21.8 Summary – Where are we at?

21.9 Where do we go from here?