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With its distinguished editor and array of international contributors, this book provides a review of current understanding of significant aspects of food structure and methods for its control. It begins with coverage of the fundamental structural elements present in foods and the forces which hold them together, discusses novel analytical techniques which can provide information on the morphology and behaviour of food materials, then examines how the principles of structural design can be employed to improve performance and functionality of foods. The book concludes with a discussion of how this knowledge can be implemented to improve properties of foods.

**MICROSTRUCTURAL ELEMENTS AND THEIR INTERACTIONS**

Polysaccharides: Their Role in Food Microstructure, V.J. Morris

Introduction

Food Polysaccharides

Functional Polysaccharides in Food

Microstructural Origins of Functional Properties

Polysaccharide Interactions with Other Food Components

Manipulating Polysaccharide Structure and Function in Foods

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Proteins in Food Microstructure Formation, H.H.J. de Jongh

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Proteins and Their Functional Groups

Protein Aggregation and Network Formation

Interface Stabilization by Proteins

Application of Protein Functionality

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Structure and Function of Fat Crystals and Their Role in Microstructure Formation in Complex Foods, D. Tang and A.G. Marangoni

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Physical Properties of Fat Crystal Networks

Physical Models of the Microstructure of Fat Crystal Networks

Microstructure of Fat Crystal Networks

Fractal Dimensions Used to Quantify Microstructure of Fat Crystal Networks

Fractal Dimension and Crystallization Kinetics

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References

Effects of Water Distribution and Transport on Food Microstructure, E. Vittadini and Y. Vodovotz

Introduction

Measuring Water Distribution and Transport in Complex Systems and Its Effect on Food Microstructure

Controlling Water Distribution and Transport to Improve the Quality of Complex Foods

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Structure and Function of Emulsifiers and Their Role in Microstructure Formation in Complex Foods, N.M. Barfod and F.V. Sparso

Introduction: Emulsifiers in Complex Foods

Structure, Properties and Interactions of Three Important Food Emulsifiers

The Role of Emulsifiers in Microstructure Formation in Complex Foods

Controlling Surfactant Behaviour to Improve Microstructure in Complex Foods

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Colloidal Systems in Foods Containing Droplets and Bubbles, E. Dickinson

Introduction

Colloidal Particles in Complex Foods

Stabilization of Oil-Water and Air-Water Interfaces

Interactions of Particles, Droplets and Bubbles in Food Colloids

Structure Formation by Particles, Droplets and Bubbles

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Using Microscopy to Probe Stability and Instability Mechanisms  
Using Microscopy to Monitor Aggregation and Gelation Processes  
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Ingredient Interactions in Complex Foods: Aggregation and Phase Separation, V.B. Tolstoguzov  
Introduction  
Macromolecular Ingredient Interactions  
Incompatibility of Biopolymers  
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**NOVEL METHODS TO STUDY FOOD MICROSTRUCTURE**

Atomic Force Microscopy (AFM) Techniques for Characterizing Food Structure, V.J. Morris  
Introduction  
AFM and Other Microscopic Methods  
Applications of AFM in Food Science  
Applications in Food Technology  
Future Trends  
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Confocal Fluorescence Microscopy (CLSM) for Food Structure Characterisation, N. Lorén, M. Langton and A.-M. Hermansson  
Introduction  
Principles of Modern CLSM  
CLSM and the Study of Food Structure  
Application of CLSM to Food Systems  
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Advances in Image Analysis for the Study of Food Microstructure, J.M. Aguilera and J.C. Germain  
Introduction: Obtaining Quantitative Microstructural Information About Food from Image Analysis

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Particular Difficulties in Image Analysis  
Advances in Image Processing and Measurement Tools  
Advances in Image Analysis Techniques  
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Food Characterisation Using Scattering Methods, T Nicolai  
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Techniques and Instruments  
Advantages and Disadvantages of Scattering Methods Over Other Methods  
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Acoustic Techniques to Characterize Food Microstructure, M Povey  
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Modelling and Computer Simulation of Food Structures, S.R. Euston, G. Costello, M.A. Naser, and M.L. Nicolosai  
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**MICROSTRUCTURAL-BASED APPROACHES TO DESIGN OF FUNCTIONALITY IN FOODS**

Creation of Novel Microstructures Through Processing: Structure Formation in (Semi-) Solid

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Food Materials, A.J. van der Goot and J. Manski

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The Effect of Processing on Structure and Molecular Properties

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Influence of Food Microstructure on Food Rheology, M.A. Rao

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Influence of Food Microstructure on Flavour Interactions, S. Ghosh and J.N. Coupland

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Relating Food Microstructure to Sensory Quality, G.A. van Aken

Introduction: Importance of Studying the Relationship Between Food Microstructures and Sensory Properties

Methods to Study the Intra-Oral Behaviour of Emulsions and Other Complex Foods

Understanding the Intra-Oral Behaviour of Foods

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Physicochemical and structural aspects of lipid digestion, D.J. McClements, E.A. Decker, and Y.

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Nanoscale Liquid Self-Assembled Dispersions in Foods and the Delivery of Functional Ingredients, N. Garti and A. Aserin

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Micellar Systems and Microemulsions

Lytotropic Liquid Crystals (Lamellar, Hexagonal, Cubic Phase) and Corresponding Dispersions (Cubosomes, Hexosomes, Micellosomes)

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**MICROSTRUCTURAL APPROACHES TO IMPROVING FOOD PRODUCT QUALITY**

Structure-Engineering of Ice-Cream and Foam-Based Foods, H.D. Goff and C. Vega

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Description and Formation of Microstructure

Methods to Study the Microstructure of Whipped Cream, Ice-Cream and Other Foam-Based Foods

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The Texture and Microstructure of Spreads, A. Bot, E. Flöter, J.G. Lammers, and E.G. Pelan

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Emulsion Microstructure: Ingredients

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Analysing Spread Texture

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Microstructural Approaches to the Study and Improvement of Cheese and Yogurt Products, J.A. Lucey

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Casein micelles: The Building Blocs of Yogurt and Cheese

Structure Development in Cheese

Structure Development in Yogurt

Methods to Study the Microstructure of Yogurt and Cheese

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Microstructural Aspects of Protein-Based Drinks, M. Mellema and A.

Introduction

Dairy Drinks: An Introduction

Effects of Processing

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The Microstructure of Chocolate, D. Rousseau

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Bubble Formation and Stabilisation in Bread Dough, E.N.C. Mills, L.J. Salt, and P.J. Wilde

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