

# Contents

<b>Contributors</b>	<b>ix</b>
<b>Woodhead Publishing Series in Food Science, Technology and Nutrition</b>	<b>xi</b>
<b>Preface</b>	<b>xxiii</b>
<b>Part One Food texture: an overview</b>	<b>1</b>
<b>1 Food texture and structure</b>	<b>3</b>
<i>J. Chen, A. Rosenthal</i>	
1.1 Introduction	3
1.2 Mapping food structure	6
1.3 Textural changes during preparation	8
1.4 Structure of specific texture-modified food	13
1.5 Texture properties of different types of food	15
1.6 Sensation and appreciation of food texture	19
1.7 Conclusions	22
References	22
<b>Part Two Novel use of food ingredients for food texture modification</b>	<b>25</b>
<b>2 Emulsifiers as food texture modifiers</b>	<b>27</b>
<i>L. Chen</i>	
2.1 Introduction	27
2.2 Types of emulsifiers	27
2.3 Interfacial properties of emulsifiers	41
2.4 Interaction between surfactants and biopolymers	43
2.5 Mouthfeel characteristics of emulsifiers	44
References	47
<b>3 Proteins as texture modifiers</b>	<b>51</b>
<i>C. Ritzoulis, P.D. Karayannakidis</i>	
3.1 Proteins as modifiers of the mechanical properties of foods	51
3.2 Mechanistic aspects of textural modification by proteins	55
3.3 Texture-modifying proteins	57
3.4 Challenges and perspectives	63
References	64

<b>4</b>	<b>Enzymatic modification of dairy product texture</b>	<b>71</b>
	<i>D. Ercili-Cura, T. Huppertz, A.L. Kelly</i>	
4.1	Introduction	71
4.2	The texture of dairy products	71
4.3	Role of indigenous milk enzymes	73
4.4	Enzymes in cheese	74
4.5	Enzymatic cross-linking of proteins	75
4.6	Structural modification of fermented milk gels by enzymatic cross-linking	80
4.7	Structural modification of cheese by enzymatic cross-linking	84
4.8	Application of other enzymatic strategies	86
4.9	A perspective on potential future trends	88
4.10	Sources of further information and advice	88
	References	89
<b>5</b>	<b>Oils and fats in texture modification</b>	<b>99</b>
	<i>B. Emadzadeh, B. Ghorani</i>	
5.1	Introduction	99
5.2	The role of fat in food systems	99
5.3	Fat replacement necessity	101
5.4	Application of fat replacers	102
5.5	Evaluation food texture fattiness	105
5.6	Novel techniques in texture recovery of low-fat food systems	108
5.7	Conclusion	110
	References	111
<b>Part Three Novel processing techniques for food texture modification</b>		<b>113</b>
<b>6</b>	<b>Improved thermal processing for food texture modification</b>	<b>115</b>
	<i>S.U. Kadam, B.K. Tiwari, C.P. O'Donnell</i>	
6.1	Introduction	115
6.2	Mechanisms of texture modifications during thermal processing	116
6.3	Methods to modify food texture	120
6.4	Conclusions	126
6.5	Future trends	127
6.6	Sources of further information and advice	128
	References	128
<b>7</b>	<b>Structure and texture development of food-emulsion products</b>	<b>133</b>
	<i>C. Chung, D.J. McClements</i>	
7.1	Introduction	133
7.2	Effect of emulsion properties on structural and textural properties	134
7.3	Novel structured emulsions	138
7.4	Food structure and textural properties assessment	144

---

7.5	Summary	148
7.6	Future trends	148
7.7	Sources of further information and advice	148
	References	149
<b>8</b>	<b>Controlled phase separation for texture modification</b>	<b>157</b>
	<i>H. Firoozmand, D. Rousseau</i>	
8.1	Introduction	157
8.2	Thermodynamics of (bio)polymer solutions	158
8.3	Susceptibility of biopolymer solutions to demixing	161
8.4	Effect of temperature change on biopolymer solutions	162
8.5	Effect of pH change on biopolymer solutions	167
8.6	Effect of addition of particles on biopolymer phase separation and rheology	169
8.7	Factors influencing the physical properties of the phase-separated gels	173
8.8	Conclusions	175
8.9	Sources of further information and advice	176
	References	176
<b>9</b>	<b>The effect of filler particles on the texture of food gels</b>	<b>183</b>
	<i>M.J. Dille, K.I. Draget, M.N. Hattrem</i>	
9.1	Introduction	183
9.2	Food gels—types of biopolymers	183
9.3	Mechanical properties of food gels	184
9.4	Particulate-filled gels and emulsion gels	186
9.5	Gelatin-based emulsion gels	192
9.6	Future trends	197
9.7	Sources of further information and advice	197
	References	198
<b>Part Four Modifying the texture of specific food commodities</b>		<b>201</b>
<b>10</b>	<b>Texture of breakfast cereals and extruded products</b>	<b>203</b>
	<i>F. Robin, S. Palzer</i>	
10.1	Introduction	203
10.2	Type and composition of major grains used in extruded cereals	203
10.3	Physicochemical modifications of starch and proteins during cereal extrusion	217
10.4	Extrusion technologies applied to cereal texturization	223
10.5	Future trends	229
10.6	Sources of further information and advice	230
	References	230

---

<b>11</b>	<b>Texture modification of soy-based products</b>	<b>237</b>
	<i>J. Guo, X.-Q. Yang</i>	
11.1	Introduction	237
11.2	Soy-based products and compositions in soybeans	238
11.3	Texture and viscosity of soymilk	241
11.4	Texture of tofu	243
11.5	Fermented soy-based flavorings	248
11.6	Future trends	250
	References	250
	<b>Index</b>	<b>257</b>