

Contents

Foreword.....	v
Preface.....	vii
CHAPTER 1. Structural and Dynamical Properties of Microheterogeneous Systems	
1.1 Introduction	1
1.2 Microscopic Picture of Molecular Ensembles	3
1.2.1. Intermolecular Interactions	3
1.2.2. Dynamical Picture of Molecular Ensembles	5
1.3 Surfactants and Surfactant Molecule Self-Assembly.....	8
1.3.1. Surfactant Packing Parameters	10
1.3.2. Nonspontaneous Aggregation Patterns of Surfactant Containing Systems	12
1.3.3. General Correlation between Supramolecular Structure and Solubilization Properties of Microheterogeneous Systems	13
1.4 Pure Surfactants and Liquid Crystals	15
1.4.1. Solubilization in Surfactant Liquid Crystals.....	19
1.5 Mono- and Multilayers.....	22
1.6 Surfactant Aggregates in Liquid Media	30
1.6.1. Surfactant/Surfactant Interactions in Liquid Media	30
1.6.2. Normal Micelles.....	41
1.6.3. Reversed Micelles.....	50
1.6.4. Water-in-Oil and Oil-in-Water Microemulsions ...	60
1.6.5. Normal and Reversed Vesicles	64
CHAPTER 2. Nucleation, Growth, and Arrested Growth in Confined Space	
2.1 Introduction	75

2.1.1.	Thermodynamic Considerations	76
2.1.2.	Kinetic Considerations	77
2.2	Nanoparticle Growth, Growth Inhibition, and Size Control.....	81
2.2.1.	Time Dependence of Nanoparticle Size and Size Distribution.....	81
2.2.2.	Nanoparticle Growth Inhibition and Size Control	83
2.3	Internal and External Parameters Controlling Nanoparticle Formation and Stability in Microheterogeneous Systems.....	87
2.3.1.	General Considerations.....	87
2.3.2.	Some Specific Examples.....	88

CHAPTER 3. Physico-chemical Properties of Nanoparticles Entrapped in Microheterogeneous Systems

3.1	Introduction	91
3.1.1.	Physico-chemical Properties of Nanoparticles	92
3.2	Quantum Size Effects	98
3.3	Surface Effects	104

CHAPTER 4. Methods of Nanoparticle Synthesis in Microheterogeneous Systems

4.1	Introduction	115
4.2	Nanoparticle Synthesis in Liquid Crystals	118
4.2.1.	Synthesis of Metallic Nanoparticles in Liquid Crystals	119
4.2.2.	Synthesis of Semiconductor Nanoparticles in Liquid Crystals	121
4.2.3.	Synthesis of Magnetic Nanoparticles in Liquid Crystals	122
4.2.4.	Synthesis of Miscellaneous Nanoparticles in Liquid Crystals	122
4.3	Nanoparticle Synthesis in Mono- and Multilayers.....	123
4.3.1.	Synthesis of Metallic Nanoparticles in Mono- and Multilayers.....	124
4.3.2.	Synthesis of Semiconductor Nanoparticles in Mono- and Multilayers	125
4.3.3.	Synthesis of Magnetic Nanoparticles in Mono- and Multilayers	127

4.3.4.	Synthesis of Miscellaneous Nanoparticles in Mono- and Multilayers	127
4.4	Nanoparticle Synthesis in Direct Micelles	128
4.4.1.	Synthesis of Metal Nanoparticles in Aqueous Micellar Solutions	129
4.4.2.	Synthesis of Semiconductor Nanoparticles in Aqueous Micellar Solutions	132
4.4.3.	Synthesis of Magnetic Nanoparticles in Aqueous Micellar Solutions	133
4.4.4.	Synthesis of Miscellaneous Nanoparticles in Aqueous Micellar Solutions	134
4.5	Nanoparticle Synthesis in Reversed Micelles	136
4.5.1.	Synthesis of Metal Nanoparticles in Reversed Micelles	137
4.5.2.	Synthesis of Semiconductor Nanoparticles in Reversed Micelles	139
4.5.3.	Synthesis of Magnetic Nanoparticles in Reversed Micelles	142
4.5.4.	Synthesis of Miscellaneous Nanoparticles in Reversed Micelles	143
4.6	Nanoparticle Synthesis in Microemulsions	145
4.6.1.	Synthesis of Metal Nanoparticles in Microemulsions	146
4.6.2.	Synthesis of Semiconductor Nanoparticles in Microemulsions	148
4.6.3.	Synthesis of Magnetic Nanoparticles in Microemulsions	148
4.6.4.	Synthesis of Miscellaneous Nanoparticles in Microemulsions	150
4.7	Nanoparticle Synthesis in Vesicles	152
4.7.1.	Synthesis of Metal Nanoparticles in Vesicle Dispersions	152
4.7.2.	Synthesis of Semiconductor Nanoparticles in Vesicle Dispersions	153
4.7.3.	Synthesis of Magnetic Nanoparticles in Vesicle Dispersions	154
4.7.4.	Synthesis of Miscellaneous Nanoparticles in Vesicle Dispersions	155
4.8	Biological Microheterogeneous Systems	156
4.9	Final Remarks	156
Index	165	