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Nota di contenuto

SELF-ASSEMBLY AND NANOTECHNOLOGY; CONTENTS; Preface and Acknowledgments; PART I. SELF-ASSEMBLY; 1. UNIFIED APPROACH TO SELF-ASSEMBLY; 1.1. Self-Assembly through Force Balance; 1.2. General Scheme for the Formation of Self-Assembled Aggregates; 1.3. General Scheme for Self-Assembly Process; 1.4. Concluding Remarks; References; 2. INTERMOLECULAR AND COLLOIDAL FORCES; 2.1. Van der Waals Force; 2.2. Electrostatic Force: Electric Double-Layer; 2.3. Steric and Depletion Forces; 2.4. Solvation and Hydration Forces; 2.4.1. Solvation Force; 2.4.2. Hydration Force; 2.5. Hydrophobic Effect; 2.6. Hydrogen Bond References; 3. MOLECULAR SELF-ASSEMBLY IN SOLUTION I: MICELLES; 3.1. Surfactants and Micelles; 3.2. Physical Properties of Micelles; 3.2.1. Micellization; 3.2.2. Critical Micellar Concentration and Aggregation Number; 3.2.3. Counterion Binding; 3.3. Thermodynamics of Micellization; 3.3.1. Mass-Action Model; 3.3.2. Pseudo-phase Separation Model; 3.3.3. Hydrophobic Effect and Enthalpy-Entropy Compensation; 3.4. Micellization versus General Scheme of Self-Assembly; 3.4.1. Change of Micelle Structures; 3.4.2. General Scheme of Micellization; 3.4.3. Concept of Force Balance and Surfactant Packing Parameter; 3.5. Multicomponent Micelles; 3.6. Micellar Solubilization; 3.7. Applications of Surfactants and Micelles; 3.7.1. Micellar Catalysis; References; 4. MOLECULAR SELF-ASSEMBLY IN SOLUTION II: BILAYERS, LIQUID CRYSTALS, AND EMULSIONS; 4.1. Bilayers; 4.1.1. Bilayer-Forming Surfactants; 4.1.2. Bilayerization; 4.1.3. Physical Properties of Bilayers; 4.2. Vesicles, Liposomes, and Niosomes; 4.2.1. Physical Properties of Vesicles; 4.2.2. Micellar Catalysis on Vesicles; 4.3. Liquid Crystals; 4.3.1. Thermotropic Liquid Crystals; 4.3.2. Lyotropic Liquid Crystals; 4.3.2.1. Concentration-Temperature Phase Diagram; 4.3.2.2. Ternary Surfactant-Water-Oil (or Co-surfactant) Phase Diagram; 4.4. Emulsions; 4.4.1. Microemulsions; 4.4.2. Reverse Micelles; 4.4.3. Macroemulsions; 4.4.4. Micellar Catalysis on Microemulsions; References; 5. COLLOIDAL SELF-ASSEMBLY; 5.1. Forces Induced by Colloidal Phenomena; 5.1.1. Surface Tension and Capillarity; 5.1.2. Contact Angle and Wetting; 5.1.3. Adhesion; 5.1.4. Gravity and Diffusion; 5.1.5. Pressures by Osmotic and Donnan Effects; 5.1.6. Electrokinetic Force; 5.1.7. Magnetophoretic Force; 5.1.8. Force by Flow; 5.2. Force Balance for Colloidal Self-Assembly; 5.3. General Scheme for Colloidal Self-Assembly; 5.4. Micelle-like Colloidal Self-Assembly: Packing Geometry; 5.5. Summary; References; 6. SELF-ASSEMBLY AT INTERFACES; 6.1. General Scheme for Interfacial Self-Assembly; 6.1.1. Surfaces and Interfaces; 6.1.2. Force Balance with Interfaces; 6.2. Control of Intermolecular Forces at Interfaces; 6.2.1. Packing Geometry: Balance with Attractive and Repulsive Forces; 6.2.2. Packing with Functional Groups: Balance with Directional Force; 6.2.2.1. Building Units with Multifunctional Sites

Sommario/riassunto

Delivers comprehensive coverage of key subjects in self-assembly and nanotechnology, approaching these and related topics with one unified concept. Designed for students and professionals alike, it explores a variety of materials and situations in which the importance of self-assembly nanotechnology is growing tremendously. Provides clear schematic illustrations to represent the mainstream principles behind each topic.