STUDIES IN INTERFACE SCIENCE

7

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Proteins at Liquid Interfaces

D. Möbius and R. Miller, editors

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Proteins At Liquid Interfaces Volume 7 Studies In Interface Science

Klaus Wandelt

Proteins At Liquid Interfaces Volume 7 Studies In Interface Science:

Dynamic Surface Tensiometry in Medicine V.N. Kazakov,O.V. Sinyachenko,V.B. Fainerman,U. Pison,R. Miller,2000-01-28 Human biological liquids contain numerous low and high molecular weight surfactants The human organism contains interfaces with enormous surfaces The physicochemical and biochemical processes taking place at these interfaces are extremely important for the vital functions of the organism as a whole and the interfacial properties may reflect peculiarities of age and sex health and disease The present book is the first attempt to systematically present the results of dynamic and equilibrium surface tensions measurements of serum and urine samples that were obtained from healthy humans of various sex and age and to compare these results with measurements of biological liquids obtained from patients suffering from various diseases or with measurements of amniotic fluid obtained from women at various stages of pregnancy Pulmonary medicine especially neonatology has systematically used interfacial tensiometry for studying pulmonary surfactant In this particular area significant progress was achieved in the treatment of diseases related to alterations of the lung surfactant system We believe that similar to the progress in pulmonary medicine attributed to surface chemical studies of lung surfactant progress in other medical branches could be expected through studies of interfacial characteristics of other human biological liquids For several years the authors of this book have been engaged in studies aimed at the improvement of the maximum bubble pressure method resulting in the development of computer controlled tensiometers which are capable of measuring dynamic surface tensions within a wide range of surface lifetime In addition to the measurement techniques a correct interpretation and analysis of the tensiometric data obtained is extremely important The kinetic theory of adsorption from solutions and the theory of equilibrium adsorption layers of surfactant protein mixtures provide the basis for both the choice of the most characteristic parameters of tensiograms and the analysis of the results Some theoretical models describing the adsorption of proteins are presented in Chapter 1 The main theoretical and experimental issues related to the maximum bubble pressure technique as applied to biological liquids are presented in Chapter 2 A more detailed discussion of the differences of the various methods in use for measuring dynamic surface tension of biological fluids is provided in Chapter 3 Chapter 4 gives data from patients with kidney disease Chapter 5 from patients with rheumatic diseases Chapter 6 with pulmonary diseases Chapter 7 with diseases of the central nervous system and Chapter 8 with neoplasms Dynamic interface tensiometry of human biological liquids is a fascinating new method which deserves a broad use for prospective studies of various diseases **Molecular Interfacial Phenomena of Polymers and Biopolymers** P Chen,2005-07-22 One of the most exciting areas of polymer research is the study of interfacial phenomena and their practical applications This major work reviews the key research in this important area and is used in such areas as biomaterials Part one looks at the thermodynamics kinetics and other fundamental properties of polymer surfaces and interfaces The second part of the book reviews ways of characterising and manipulating interfacial phenomena It includes examples of practical

applications such as vaccine delivery tissue engineering and the development of therapeutic lung surfactants With its distinguished editor and international team of contributors Molecular interfacial phenomena of polymers and biopolymers is a standard work on understanding polymeric interfacial properties and their medical and other practical applications Reviews key research in this hot area including biomaterials Examines polymeric interfacial properties and reviews medical and other practical applications Edited by a leading authority with contributions from distinguished experts worldwide

Surface and Interface Science, Volumes 7 and 8 Klaus Wandelt,2020-03-30 Dieses einzigartige Handbuch in zehn B nden behandelt alle grundlegenden Aspekte der Oberfl chen und Grenzfl chenwissenschaften bietet f r Wissenschaftler der Fachrichtung einen umfassenden berblick ber das Forschungsgebiet und eignet sich als Einf hrung f r alle die neu in dem Fachgebiet sind **Particles at Fluid Interfaces and Membranes** P. Kralchevsky,K. Nagayama,2001-01-22 In the small world of micrometer to nanometer scale many natural and industrial processes include attachment of colloid particles solid spheres liquid droplets gas bubbles or protein macromolecules to fluid interfaces and their confinement in liquid films This may lead to the appearance of lateral interactions between particles at interfaces or between inclusions in phospholipid membranes followed eventually by the formation of two dimensional ordered arrays The book is devoted to the description of such processes their consecutive stages and to the investigation of the underlying physico chemical mechanisms The first six chapters give a concise but informative introduction to the basic knowledge in surface and colloid science which includes both traditional concepts and some recent results Chapters 1 and 2 are devoted to the basic theory of capillarity kinetics of surfactant adsorption shapes of axisymmetric fluid interfaces contact angles and line tension Chapters 3 and 4 present a generalization of the theory of capillarity to the case in which the variation of the interfacial membrane curvature contributes to the total energy of the system The generalized Laplace equation is applied to determine the configurations of free and adherent biological cells Chapters 5 and 6 are focused on the role of thin liquid films and hydrodynamic factors in the attachment of solid and fluid particles to an interface Surface forces of various physical nature are presented and their relative importance is discussed Hydrodynamic interactions of a colloidal particle with an interface or another particle are also considered Chapters 7 to 10 are devoted to the theoretical foundation of various kinds of capillary forces When two particles are attached to the same interface membrane capillary interactions mediated by the interface or membrane appear between them Two major kinds of capillary interactions are described i capillary immersion force related to the surface wettability Chapter 7 ii capillary flotation force originating from interfacial deformations due to particle weight Chapter 8 Special attention is paid to the theory of capillary immersion forces between particles entrapped in spherical liquid films Chapter 9 A generalization of the theory of immersion forces allows one to describe membrane mediated interactions between protein inclusions into a lipid bilayer Chapter 10 Chapter 11 is devoted to the theory of the capillary bridges and the capillary bridge forces whose importance has been recognized in phenomena like consolidation of granules and soils wetting

of powders capillary condensation long range hydrophobic attraction etc The nucleation of capillary bridges is also examined Chapter 12 considers solid particles which have an irregular wetting perimeter upon attachment to a fluid interface The undulated contact line induces interfacial deformations which engender a special lateral capillary force between the particles The latter contributes to the dilatational and shear elastic moduli of particulate adsorption monolayers Chapter 13 describes how lateral capillary forces facilitated by convective flows and some specific and non specific interactions can lead to the aggregation and ordering of various particles at fluid interfaces or in thin liquid films Recent results on fabricating two dimensional 2D arrays from micrometer and sub micrometer latex particles as well as 2D crystals from proteins and protein complexes are reviewed Chapter 14 presents applied aspects of the particle surface interaction in antifoaming and defoaming The mechanisms of antifoaming action involve as a necessary step the entering of an antifoam particle at the air water interface The considered mechanisms indicate the factors for control of foaminess **Emulsions** Reinhard Miller,Eduardo Guzmán-Solís,2025-08-21 This book presents a comprehensive investigation of the complex scientific principles and practical applications of emulsions offering valuable references for researchers industry professionals and advanced students in the fields of physical chemistry material sciences and engineering The book is structured in three sections which allow the readers to explore the fundamental principles of interfacial phenomena the methodologies for emulsion preparation and the diverse applications of emulsions in various industrial branches in depth The initial section establishes the fundamental principles with a particular focus on the physico chemical characterization of interfaces pertinent to emulsion stabilization The book meticulously examines several topics including adsorption dynamics particle laden interfaces and thin liquid films It supports these discussions with a combination of experimental techniques and theoretical insights The second section shifts focus to the practical aspects of emulsion production examining state of the art methods the role of stabilizers and strategies for enhancing their stability including innovations in nanoemulsions and aqueous two phase systems The final section presents several real world applications demonstrating the significant role that emulsions play in a number of fields including the petroleum industry pest control and pharmaceutical formulations This text featuring contributions from leading experts synthesizes foundational knowledge and cutting edge research thereby bridging the gap between theory and practice With an interdisciplinary scope the book addresses both academic and industrial perspectives and is therefore an indispensable addition to the library of anyone working with emulsions It provides the tools and understanding required to advance work in the development of new materials optimization of formulations and investigation of the mechanics of interfacial systems

Excipient Applications in Formulation Design and Drug Delivery Ajit S Narang,Sai H S. Boddu,2015-10-07 In recent years emerging trends in the design and development of drug products have indicated ever greater need for integrated characterization of excipients and in depth understanding of their roles in drug delivery applications This book presents a concise summary of relevant scientific and mechanistic information that can aid the use of excipients in

formulation design and drug delivery applications Each chapter is contributed by chosen experts in their respective fields which affords truly in depth perspective into a spectrum of excipient focused topics This book captures current subjects of interest with the most up to date research updates in the field of pharmaceutical excipients This includes areas of interest to the biopharmaceutical industry users students educators excipient manufacturers and regulatory bodies alike **Novel Methods to Study Interfacial Layers** D. Moebius,R. Miller,2001-10-30 This book presents a number of selected papers given at the LB9 conference held in Potsdam Germany in August 2000 It is dedicated to new techniques and methodologies for studying interfacial layers One group of manuscripts deals with the application of surface plasmons at solid interfaces used for example in resonance spectroscopy and light scattering New applications of various types of Atomic Force Microscopy are reported making use of various modifications of tips A number of chapters are dedicated to light emitting diodes built with the help of LB layers The aim of these studies is the improvement of efficiency Electrochemical methods were described as tools for developing sensors in particular miniaturised pH or gas sensors The application of synchrotron X ray and NMR techniques have been described in detail in two extended chapters It is demonstrated how molecular information can be detected by these methods for various types of interfacial layers This monograph along with 130 papers that have been submitted for publication in the special issues of relevant journals represent the proceedings of the LBP conference **Interfacial Separation of Particles** Shouci Lu,Robert J Pugh,Eric Forssberg,2005-01-25 Interfacial Separation of Particles is concerned with the processing and separation of fine solid particles in liquid solutions using interfacial technology Interfacial separation has been finding wide application in many industrial fields such as pigment and filler production mineral processing environmental protection hydrometallurgy bioengineering food and beverage industry and chemical industry This book describes all interfacial separation techniques and discusses the general and specific fundamentals of the techniques The book intends to promote theoretical understanding and the more promising developments of interfacial separation technology whilst broadening the reader s background knowledge of industrial suspensions Is clearly written based on strong systematic science fundamentals Provides comprehensive coverage on particle technology mineral processing and water treatment Includes practical examples from the different industrial fields *Food Colloids, Biopolymers and Materials* Eric Dickinson,Ton Van Vliet,2007-10-31 Food scientists aim to control the taste and texture of existing food products and to formulate new structures of high quality using novel combinations of ingredients and processing methods Food Colloids Biopolymers and Materials describes the physical chemistry and material science underlying the formulation and behaviour of multi phase food systems and includes descriptions of new experimental techniques recent food colloids research findings authoritative overviews of conceptual issues Essential new findings are presented and emphasis is placed on the interfacial and gelation properties of food proteins and the role of colloidal and biopolymer interactions in determining the properties of emulsions dispersions gels and foams Specific topics include

confocal microscopy diffusing wave spectroscopy protein polysaccharide interactions biopolymer phase separation fat crystallization bubble droplet coalescence and bulk and surface rheology This book is the latest addition to the highly regarded food colloid series published by the Royal Society of Chemistry and is of relevance to those working and researching in food science and surface and colloid science **Hydrophile - Lipophile Balance of Surfactants and Solid Particles** Pyotr M Kruglyakov,2000-10-18 This book considers the different concepts of hydrophile lipophile balance HLB of surfactants and solid particles and the main physicochemical properties of surfactant and solid interfaces which are used to definite the hydrophile lipophile balance The book comprehensively analyses all interfacial and bulk properties of surfactants used for the determination of HLB such as interfacial tension distribution coefficient adsorption surface pressure surfactants solubility structure characteristics distribution between heteropolar phases micellar formation chromatographic characteristics phase separation in emulsions phase inversion temperature formation of three phase systems The central point of the book is the energetic interpretation of the balance i e the hydrophile lipophile ratio At the same time the HLB number systems of Griffin and Davies and other independant methods of the hydrophile lipophile balance definitions are discussed PIT polarity indexes surfactant affinity difference etc The possibility of application of the different characteristics of the hydrophile lipophile balance as a criterion of phase inversion in emulsions and microemulsion systems water oil surfactant are considered For the first time the different methods of the hydrophile lilophile balance definition for solid particles in compact and dispersed form are suggested by the author The use of hydrophile lipophile characteristics of solid particles as a criterion of phase inversion in emulsion stabilisation and for other applications is discussed

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