

Colloidal Particles At Liquid Interfaces

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Colloidal Particles at Liquid Interfaces edited by Bernard ...

Abstract. The adsorption of colloidal particles to fluid interfaces is a phenomenon that is of interest to multiple disciplines across the physical and biological sciences. In this review we provide an entry level discussion of our current understanding on the physical principles involved and experimental observations of the adsorption of a single isolated particle to a liquid–liquid interface.

Colloidal particles at fluid interfaces: behaviour of ...

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^ Colloidal Particles At Liquid Interfaces ^ Uploaded By Norman Bridwell, small solid particles adsorbed at liquid interfaces arise in many industrial products and process such as anti foam formulations crude oil emulsions and flotation they act in many ways like traditional surfactant molecules but offer distinct advantages however the

Colloidal Particles At Liquid Interfaces

Colloidal particles, similar to surfactant molecules, can spontaneously accumulate at the interface between two immiscible fluids (liquid–gas or liquid–liquid); they are therefore surface active.4This fact was realised in the beginning of the last century by Ramsden5and Pickering6whose merit for instigating the field of particles at liquid interfaces will be discussed later.

Colloidal Particles at Liquid Interfaces: An Introduction

Colloidal particles, similar to surfactant molecules, can spontaneously accumulate at the interface between two immiscible fluids (liquid—gas or liquid—liquid); they are therefore surface active.

Colloidal particles at liquid interfaces: An introduction ...

In both cases, their physical properties differ from those of isotropic particles, making them poten- tially useful for assembling photonic crystals with novel symmetries, colloidal substitutes for liquid crystals and elec- trorheological fluids.1,2Other applications of anisotropic col- loids include the control of suspension rheology and optical properties.2,3stabilization of emulsions4and foams5and en- gineering of biomaterials6and complex colloidal composites.7

Colloidal particles at liquid interfaces - Orlin D. Velev

COLLOIDAL PARTICLES AT LIQUID INTERFACES: Small solid particles adsorbed at liquid interfaces arise in many industrial products and processes, such as anti-foam formulations, crude oil emulsions and flotation. They act in many ways like traditional surfactant molecules, but offer distinct advantages. However, the understanding of how these particles operate in such systems is minimal.

COLLOIDAL PARTICLES AT LIQUID INTERFACES

colloidal particles at liquid interfaces Sep 08, 2020 Posted By Kyotaro Nishimura Publishing TEXT ID 3402844f Online Ebook Epub Library adsorb to liquid interfaces which provides an ideal two dimensional confinement for the investigation of self assembly processes we correlate the interfacial properties and

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Colloidal particles of different types and shapes, ranging in size from a few nanometres to several micrometers, may assemble at the interface between two fluids, including cases where the fluids are both liquid and cases where one is liquid and the other is gaseous.

Colloidal Particles at a Range of Fluid-Fluid Interfaces ...

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Equilibrium interfaces were established between body-centered cubic (BCC) crystals and their liquid using charged colloidal particles in an electric bottle. By measuring a time series of interfacial positions and computing the average power spectrum, their interfacial stiffness was determined according to the capillary fluctuation method. For the (100) and the (114) interfaces, the stiffnesses were 0.15 and 0.18 k B T / *a* 2 (*a*: particle diameter), respectively, and were isotropic in the ...

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There has been much scientific interest in the behaviour of colloidal particles at liquid interfaces. From a research aspect they provide model systems for fundamental studies of condensed matter physics. From a commercial aspect they provide applications for making new materials in the cosmetics, food and paint industries. In many cases of colloidal particles at interfaces, the mechanism of particle interactions is still unknown. Particle-Stabilized Emulsions and Colloids looks at recent studies on the behaviour of particles at liquid interfaces. The book first introduces the basic concepts and principles of colloidal particles at liquid-liquid interfaces including the interactions and conformations. The book then discusses the latest advances in emulsions and bicontinuous emulsions stabilized by both solid and soft particles and finally the book covers applications in food science and oil extraction. With contributions from leading experts in these fields, this book will provide a background to academic researchers, engineers, and graduate students in chemistry, physics and materials science. The commercial aspects will also be of interest to those working in the cosmetics, food and oil industry.

Planar fluid interfaces -- Interfaces of moderate curvature : theory of capillarity -- Surface bending moment and curvature elastic moduli -- General curved interfaces and biomembranes -- Liquid films and interactions between particle and surface -- Particles at interfaces : deformations and hydrodynamic interactions -- Lateral capillary forces between partially immersed bodies -- Lateral capillary forces between floating particles -- Capillary forces between particles bound to a spherical interface -- Mechanics of lipid membranes and interaction between inclusions -- Capillary bridges and capillary-bridge forces -- Capillary forces between particles of irregular contact line -- Two-dimensional crystallization of particulates and proteins -- Effect of oil drops and particulates on the stability of foams.

Surfactants... today you have probably eaten some, or rubbed others on your body. Plants, animals (including you) and microorganisms make them, and many everyday products (e.g. detergents, cosmetics, foodstuffs) contain them. Surfactant molecules have one part which is soluble in water and another which is not. This gives surfactant molecules two valuable properties: 1) they adsorb at surfaces (e.g. of an oil droplet in water), and 2) they stick together (aggregate) in water. The aggregates (micelles) are able to dissolve materials not soluble in water alone, and adsorbed surfactant layers, at the surfaces of particles or (say) oil droplets in water, stop the particles or drops sticking together. This is why stable emulsions such as milk do not separate into layers. This book treats the basic physical chemistry and physics underlying the behaviour of surfactant systems. In this book, you will first learn about some background material including hydrophobic hydration, interfacial tension and capillarity (Section I). Discussion of surfactant adsorption at liquid/fluid and solid/liquid interfaces is given in Section II, and includes thermodynamics of adsorption, dynamic and rheological aspects of liquid interfaces and the direct characterisation of surfactant monolayers. In Section III, a description is given of surfactant aggregation to give micelles, lyotropic liquid crystals, microemulsions and Winsor systems. There follows a discussion of surface forces and the way they confer stability on lyophobic colloids and thin liquid films (Section IV). Various dispersions stabilised by adsorbed surfactant or polymer (including solid in liquid dispersions, emulsions and foams) are considered in Section V. The wetting of solids and liquids is explored in Section VI. Like surfactants, small solid particles can adsorb at liquid/fluid interfaces, form monolayers and stabilise emulsions and foams. Such behaviour is covered in Section VII. It is assumed the reader has a knowledge of undergraduate physical chemistry, particularly chemical thermodynamics, and of simple physics. Mathematics (elementary algebra and calculus) is kept at a level consistent with the straightforward derivation of many of the equations presented.

Particles at Fluid Interfaces encompasses the processes and formulations that involve the stabilisation of fluid interfaces by adsorbed particles. The prevalence of these multiphase materials underpins their use in a broad range of industries from personal care and food technology to oil and mineral processing. The stabilisation conferred by the adsorbed particles can be transient as found in froth flotation or long-lived as occurs within Pickering Emulsions. The particles can range in size from nanoparticles to millimetre-sized particles, and cover a spectrum from collapsed proteins, polymeric colloids of controlled size and shape to high dispersity mineral particles.

Colloid and Interface Chemistry for Water Quality Control provides basic but essential knowledge of colloid and interface science for water and wastewater treatment. Divided into two sections, chapters 1 to 8 presents colloid chemistry including simple history and basic concepts, diffusion and Brown Motion, sedimentation, osmotic pressure, optical properties, rheology properties, electric properties, emulsion, foam and gel, and so on; chapters 9 to provides interface chemistry theories including the surface of liquid, the surface of solution, and the surface of solid. This valuable book is the only one that presents colloid and interface chemistry from the water quality control perspective. This book was written for graduate students in the area of water treatment and environmental engineering, and it could be used as the reference for researchers and engineers in the same area. Concise content makes this suitable for both teaching and learning Focuses on water treatment technology and methods, links colloid and surface chemistry to water treatment applications Not only addresses all the important physical-chemistry principles and theories, but also presents new developed knowledge on water treatment includes exercises, problems and solutions, which are very helpful for testing learning and understanding

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.

Theory of Colloid and Interfacial Electric Phenomena is written for scientists, engineers, and graduate students who want to study the fundamentals and current developments in colloid and interfacial electric phenomena, and their relation to stability of suspensions of colloidal particles and nanoparticles in the field of nanoscience and nanotechnology. The primary purpose of this book is to help understand how the knowledge on the structure of electrical double layers, double layer interactions, and electrophoresis of charged particles will be important to understand various interfacial electric phenomena and to improve the reader's skill and save time in the study of interfacial electric phenomena. Also providing theoretical background and interpretation of electrokinetic phenomena and many approximate analytic formulas describing various colloid and interfacial electric phenomena, which will be useful and helpful to understand these phenomena analyse experimental data. Showing the fundamentals and developments in the field First book to describe electrokinetics of soft particles Providing theoretical background and interpretation of electrokinetic phenomena

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