

Particles At Fluid Interfaces And Membranes Volume 10 Attachment Of Colloid Particles And Proteins To Interfaces And Formation Of Two Dimensional Arrays Studies In Interface Science

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Comprehensive Membrane Science and Engineering - Enrico Drioli 2010-07-09

This multivolume work covers all aspects of membrane science and technology - from basic phenomena to the most advanced applications and future perspectives. Modern membrane engineering is critical to the development of process-intensification strategies and to the stimulation of industrial growth. The work presents researchers and industrial managers with an indispensable tool toward achieving these aims. Covers membrane science theory and economics, as well as applications ranging from chemical purification and natural gas enrichment to potable water. Includes contributions and case studies from internationally recognized experts and from up-and-coming researchers working in this multi-billion dollar field. Takes a unique, multidisciplinary approach that stimulates research in hybrid technologies for current (and future) life-saving applications (artificial organs, drug delivery)

Transport Mediated by Electrified Interfaces - 2003-08-14

Transport Mediated by Electrified Interfaces provides an overview of the innovative use of electro-kinetic phenomena in experimentally exploring non-equilibrium regions of chemically non-reacting systems. Transport phenomena mediated by charged liquid-liquid interfaces and solid-liquid interfaces are also covered. Transport phenomena mediated by electrified interfaces are discussed in the context of a number of important areas, including, soil/water systems, phase transfer catalysis, animal/plant physiology and mimicking taste/smell sensing mechanisms. Provides an overview of the innovative use of electro-kinetic phenomena. Discusses conventional electro-kinetics and other transport phenomena mediated by charged interfaces. Of special interest to those working in the area of interface science

COMMON FUNDAMENTALS AND UNIT OPERATIONS IN THERMAL DESALINATION SYSTEMS - Volume I - 2010-11-08

These volumes are part of Encyclopedia of Water Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. The three volumes present state-of-the art subject matter of various aspects of Common Fundamentals

and Unit Operations in Thermal Desalination Systems such as: Conventional Water Treatment Technologies; Guidelines for Potable Water Purification; Advanced Treatment Technologies for Recycle - Reuse of Domestic Wastewater; Composition of Desalinated Water; Crystallization; Deep Bed Filtration: Modeling Theory and Practice; Distillation ; Rectification; Flocculation and Flocculation Filtration; Hazardous Waste Treatment Technologies; Microfiltration and Ultrafiltration; Post-Treatment of Distillate and Permeate; Pre-Cleaning Measures: Filtration; Raw Water Pre-Treatment: Sludge Treatment Technologies; Supercritical Extraction; Potential for Industrial Wastewater Reuse; Treatment of Industrial Wastewater by Membrane Bioreactors; Unconventional Sources of Water Supply; Problem of Non-Condensable Gas Release in Evaporators; Entrainment in Evaporators; Mist Eliminators; Chemical Hazards in Seawater Desalination by the Multistage-Flash Evaporation Technique; Concentration of Liquid Foods; Environmental Impact of Seawater Desalination Plants; Environmental Impacts of Intakes and Out Falls; Industrial Ecology, Water Resources, and Desalination; Rural and Urban Water Supply and Sanitation; Sustainable Development, Water Supply and Sanitation Technology. These volumes are aimed at the following five major target audiences: University and College Students Educators, Professional Practitioners, Research Personnel and Policy and Decision Makers.

Statistical Thermodynamics Of Surfaces, Interfaces, And Membranes - Samuel Safran 2018-03-08

Understanding the structural and thermodynamic properties of surfaces, interfaces, and membranes is important for both fundamental and practical reasons. Important applications include coatings, dispersants, encapsulating agents, and biological materials. Soft materials, important in the development of new materials and the basis of many biological systems, cannot be designed using trial and error methods due to the multiplicity of components and parameters. While these systems can sometimes be analyzed in terms of microscopic mixtures, it is often conceptually simpler to regard them as dispersions and to focus on the properties of the internal interfaces found in these systems. The basic physics centers on the properties of quasi-two-dimensional systems embedded in the three-dimensional

world, thus exhibiting phenomena that do not exist in bulk materials. This approach is the basis behind the theoretical presentation of *Statistical Thermodynamics of Surfaces, Interfaces, and Membranes*. The approach adapted allows one to treat the rich diversity of phenomena investigated in the field of soft matter physics (including both colloid/interface science as well as the materials and macromolecular aspects of biological physics) such as interfacial tension, the roughening transition, wetting, interactions between surfaces, membrane elasticity, and self-assembly. Presented as a set of lecture notes, this book is aimed at physicists, physical chemists, biological physicists, chemical engineers, and materials scientists who are interested in the statistical mechanics that underlie the macroscopic, thermodynamic properties of surfaces, interfaces, and membranes. This paperback edition contains all the material published in the original hard-cover edition as well as additional clarifications and explanations.

Advances in Contact Angle, Wettability and Adhesion - K. L. Mittal 2015-09-22
This book is the second volume in the series "Contact Angle, Wettability and Adhesion." The premier volume was published in 2013. Even a cursory glance at the literature show that in recent years the interest in understanding and controlling wetting behavior has grown exponentially. Currently, there is tremendous research activity in rendering surfaces superhydrophobic, superhydrophilic, superoleophobic, superoleophilic, omniphobic and omniphilic because of their applications in many technologically important fields. Also the durability or robustness of materials with such super" characteristics is extremely significant, as well as the utilization of "green" (biobased) materials to obtain such surfaces. This book containing 19 articles reflects more recent developments in certain areas covered in its predecessor volume as well as it includes some topics which were not covered before. Concomitantly, this book provides a medium to keep abreast of the latest research activity and developments in the arena of contact angle, wettability and adhesion. The topics discussed include: Understanding of wetting hysteresis; fabrication of superhydrophobic materials; plasma treatment to achieve superhydrophilic surfaces; highly liquid repellent textiles; modification of paper surfaces to control liquid wetting and adhesion; Cheerios effect and its control; engineering materials with superwettability; laser ablation to create micro/nano-patterned surfaces; liquid repellent amorphous carbon nanoparticle networks; mechanical durability of liquid repellent surfaces; wetting of solid walls and spontaneous capillary flow; relationship between roughness and oleophilicity; superhydrophobic and superoleophobic green materials; computational analysis of wetting on hydrophobic surfaces: application to self-cleaning mechanisms; bubble adhesion to superhydrophilic surfaces; surface free energy of superhydrophobic materials; and role of surface free energy in pharmaceutical tablet tensile strength.

Liquid Crystals with Nano and Microparticles - Jan P F Lagerwall 2016-10-10

While liquid crystals are today widely known for their successful application in flat panel displays (LCDs), academic liquid crystal research is more and more targeting situations where these anisotropic fluids are put to completely different use, in varying contexts. A particularly strong focus is on colloidal liquid crystals, where particles, bubbles or drops are dispersed in a liquid crystal phase. The liquid crystal can act as a host phase, with the inclusions constituting foreign guests that disturb the local order in interesting ways, often resulting in large-scale positional arrangement and/or uniform alignment of the guests. But it may also be formed by solid particles themselves, if these are of nanoscale dimensions and of disc- or rod-shape, and if they are suspended in an

isotropic liquid host at sufficient concentration. This book aims to cover both the modern research tracks, gathering pioneering researchers of the different subfields to give a concise overview of the basis as well as the prospects of their respective specialties. The scope spans from curiosity-driven fundamental scientific research to applied sciences. Over the course of the next decade, the former is likely to generate new tracks of the latter type, considering the exploratory and productive phase of this young research field.

Contents: Introduction (G Scalia and J P F Lagerwall) Volume 1: Fundamentals: A Phenomenological Introduction to Liquid Crystals and Colloids (J P F Lagerwall) Nanoparticle Dispersions: A Colloid and Polymer Solution Perspective (P van der Schoot) Nematic Liquid Crystals Doped with Nanoparticles: Phase Behavior and Dielectric Properties (M A Osipov and M V Gorkunov) Methods for Studying Liquid Crystals and Their Inclusions: Conventional and Nonlinear Optical Microscopy of Liquid Crystal Colloids (T Lee and I I Smalyukh) X-Ray Scattering (G Ungar, Z Chen and X Zeng) Raman Spectroscopy (H F Gleeson) Manipulation of Inclusions with Optical Tweezers (M Skarabot) Atomic Force Microscopy on Liquid Crystals (C Bahr and B Schulz) Micron Scale Inclusions in Liquid Crystals: Solid Microparticles in Nematic Liquid Crystals (Igor Mušević) Inclusions in Freely Suspended Smectic Films (R Stannarius and K Harth) Liquid Crystal-Enabled Electrophoresis and Electro-Osmosis (O D Lavrentovich) Volume 2: Nanoparticles in Liquid Crystals: Nanoparticles in Discotic Liquid Crystals (S Kumar) Metallic and Semiconducting Nanoparticles in LCs (A Sharma, M Urbanski, T Moria, H-S Kitzerow and T Hegmann) Inorganic Nanotubes and Nanorods in Liquid Crystals (I Drevenšek-Olenik) Liquid Crystals from Mesogens Containing Gold Nanoparticles (W Lewandowski and E Gorecka) Carbon Nanotubes in Thermotropic Low Molar Mass Liquid Crystals (S Schymura, J Park, I Dierking and G Scalia) Carbon Nanotubes Dispersed in Liquid Crystal Elastomers (Y Yang and Y Ji) Ferromagnetic and Ferroelectric Nanoparticles in Liquid Crystals (Y Reznikov, A Glushchenko and Y Garbovskiy) Nanoparticle Guests in Lyotropic Liquid Crystals (S Dölle, J H Park, S Schymura, Hyeran Jo, G Scalia and J P F Lagerwall) Control of Nanoparticle Self-Assemblies Using Distorted Liquid Crystals (E Lacaze and D Coursault) Nanoparticles and Networks Created Within Liquid Crystals (S-W Kang and S Kundu) Liquid Crystals Formed by Nanoparticle Suspensions: Nematic Phase Formation in Suspensions of Carbon Nanotubes (C Zakri and Ph Poulin) Nematic Phase Formation in Suspensions of Graphene Oxide (N Fresneau and S Campidelli) Electro-Optical Switching of Liquid Crystals of Graphene Oxide (J Song) Liquid Crystalline Phases in Suspensions of Pigments in Non-Polar Solvent (S Klein, R Richardson and A Eremin) Cholesteric Liquid Crystal Formation in Suspensions of Cellulose Nanocrystals (C Honorato-Rios, J Bruckner, C Schütz, S Wagner, Z Tosheva, L Bergström and J P F Lagerwall) Subject Index Readership: This book would be beneficial as a reference work for researchers active in the field as well as for other researchers aiming to enter the field.

Encyclopedia of Surface and Colloid Science - P. Somasundaran 2006

Membranes: Volume 752 - Materials Research Society. Meeting 2003-04-11

The objective of this 2003 volume from the Materials Research Society is twofold - to provide an overview of advances in membrane science and technology and to enhance communication among membrane researchers from a variety of disciplines including chemistry, biology, biotechnology, chemical engineering and materials science. Membranes can be used for inert or reactive separations in a variety of fields including gas purification, water treatment, energy storage and conversion, bio-technology and biomedicine. The book brings together scientists involved in

the entire spectrum of modern approaches to membrane science and technology to address synthesis, characterization and transport properties and their use in established and emerging applications. Topics include: membrane synthesis and preparation; surface modification and additives; hybrid and composite membranes; membrane characterization; transport phenomena in membranes; charged membranes and ion transfer; gas permeation and separation; pervaporation and vapor permeation; dense membranes for hydrogen separation; applications in biotechnology and biomedicine; and membrane R&D for industrial and emerging applications.

Particles at Fluid Interfaces - Erica Wanless 2019-05-09

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.

Surface Activity in Drug Action - 2005-03-01

Surface activity is present in living systems; for example in body fluid or cell soup and molecules of surface-active nature are crucial to living matter and its organization. Surface Activity in Drug Action proposes "a liquid membrane hypothesis of drug action" for surface-active drugs. Chapters 1-7 contains an account of the hypothesis and chapter 8 contains a general account of the application of surface activity in therapeutics. The methodology and presentation of the information makes Surface Activity in Drug Action valuable reading for students and researchers interested in surface activity. * Is clearly written * Includes contributions from prominent names in the field, such as Bhise and Subrahmanyam * Contains a general account of the application of surface activity in therapeutics

Anisotropic Particle Assemblies - Ning Wu 2018-07-12

Anisotropic Particle Assemblies: Synthesis, Assembly, Modeling, and Applications covers the synthesis, assembly, modeling, and applications of various types of anisotropic particles. Topics such as chemical synthesis and scalable fabrication of colloidal molecules, molecular mimetic self-assembly, directed assembly under external fields, theoretical and numerical multi-scale modeling, anisotropic materials with novel interfacial properties, and the applications of these topics in renewable energy, intelligent micro-machines, and biomedical fields are discussed in depth. Contributors to this book are internationally known experts who have been actively studying each of these subfields for many years. This book is an invaluable reference for researchers and chemical engineers who are working at the intersection of physics, chemistry, chemical engineering, and materials science and engineering. It educates students, trains the next generation of researchers, and stimulates continuous development in this rapidly emerging area for new materials and innovative technologies. Provides comprehensive coverage on new developments in anisotropic particles Features chapters written by emerging and leading experts in each of the subfields Contains information that will appeal to a broad spectrum of professionals, including but not limited to chemical engineers, chemists, physicists, and materials scientists and engineers Serves as both a reference book for researchers and a textbook for graduate students

Particles at Fluid Interfaces and Membranes - P. Kralchevsky 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.

Novel Methods to Study Interfacial Layers - D. Moebius 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.

Robotic Microassembly - Michael Gauthier 2011-01-14

Discover the latest models and methods for robotic microassembly from around the world This book presents and analyzes new and emerging models and methods developed around the world for robotic microassembly, a new and innovative way to produce better microsystems. By exploring everything from the physics of micromanipulation to microassembly to microhandling, it provides the first complete overview and review of this rapidly growing field. *Robotic Microassembly* is divided into three parts: Part One: Modeling of the Microworld Part Two: Handling Strategies Part Three: Robotic and Microassembly Together, these three parts feature eight chapters contributed by eight different authors. The authors, internationally recognized experts in the field of robotic microassembly, represent research laboratories in Asia, Europe, and North America. As a result, readers get a remarkable perspective on different approaches to robotic microassembly from around the world. Examples provided throughout the chapters help readers better understand how these different approaches work in practice. References at the end of each chapter lead to the primary literature for further investigation of individual topics. *Robotic microassembly* offers a new, improved way to manufacture high-performance microelectro-mechanical systems (MEMS). Therefore, any professional or student involved in microrobotics, micromechatronics, self-assembly or MEMS will find plenty of novel ideas and methods in this book that set the stage for new approaches to design and build the next generation of MEMS and microproducts.

Organized Monolayers and Assemblies: Structure, Processes and Function - 2002-11-20

This title presents the state-of-the-art in molecular engineering and new developments in the fields of materials science, membrane biophysics, interfaces, sensing, and intermolecular interactions including molecular recognition. Topics covered are: the organization (orientation and association) of molecules in ultrathin films (monolayers) at the air/water interface; long range order in these films and in assemblies of such films on solid substrates; the interactions with solutes in the aqueous phase (including tensides, enzymes and analytes); and the potential applications of ultrathin films as nanometric modules in devices. Contributions are from leading scientists in their fields. The book presents the most recent developments in molecular engineering. Aims to stimulate new developments in the field of materials science

Rheology - Volume I - Crispulo Gallegos 2010-11-30

Rheology is a component of Encyclopedia of Chemical Sciences, Engineering and

Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty Encyclopedias. Rheology is the study of the flow of matter. It is classified as a physics discipline and focuses on substances that do not maintain a constant viscosity or state of flow. That can involve liquids, soft solids and solids that are under conditions that cause them to flow. It applies to substances which have a complex molecular structure, such as muds, sludges, suspensions, polymers and other glass formers, as well as many foods and additives, bodily fluids and other biological materials. The theme on Rheology focuses on five main areas, namely, basic concepts of rheology; rheometry; rheological materials, rheological processes and theoretical rheology. Of course, many of the chapters contain material from more than one general area. Rheology is an interdisciplinary subject which embraces many aspects of mathematics, physics, chemistry, engineering and biology. These two volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

Capillary Forces in Microassembly - Pierre Lambert 2007-08-29

Capillary Forces in Microassembly discusses the use of capillary forces as a gripping principle in microscale assembly. Clearly written and well-organized, this text brings together physical concepts at the microscale with practical applications in micromanipulation. Throughout this work, the reader will find a review of the existing gripping principles, elements to model capillary forces as well as descriptions of the simulation and experimental test bench developed to study the design parameters. Using well-known concepts from surface science (such as surface tension, capillary effects, wettability, and contact angles) as inputs to mechanical models, the amount of effort required to handle micro-components is then predicted. Researchers and engineers involved in micromanipulation and precision assembly will find this a highly useful reference for microassembly system design and analysis.

Surface and Interface Science, Volumes 5 and 6 - Klaus Wandelt 2016-03-14

In eight volumes, *Surface and Interface Science* covers all fundamental aspects and offers a comprehensive overview of this research area for scientists working in the field, as well as an introduction for newcomers. Volume 5: Solid-Gas Interfaces I Topics covered: Basics of Adsorption and Desorption Surface Microcalorimetry Adsorption of Rare Gases Adsorption of Alkali and Other Electro-Positive Metals Halogen adsorption on metals Adsorption of Hydrogen Adsorption of Water Adsorption of (Small) Molecules on Metal Surfaces Surface Science Approach to Catalysis Adsorption, Bonding and Reactivity of Unsaturated and Multifunctional Molecules Volume 6: Solid-Gas Interfaces II Topics covered: Adsorption of Large Organic Molecules Chirality of Adsorbates Adsorption on Semiconductor Surfaces Adsorption on Oxide Surfaces Oscillatory Surface Reactions Statistical Surface Thermodynamics Theory of the Dynamics at Surfaces Atomic and Molecular Manipulation

Current Trends and Future Developments on (Bio-) Membranes - Angelo Basile 2021-12-04

Current Trends and Future Developments on (Bio-) Membranes: Techniques of Computational Fluid Dynamic (CFD) for Development of Membrane Technology provides updates on new progress in membrane processes due to various challenges and how many industrial companies and academic centers are carrying out these processes. Chapters help readers understand techniques of computational fluid dynamic (CFD) for the development of membrane technology, including an introduction to the

technologies, their applications, and the advantages/disadvantages of CFD modeling of various membrane processes. In addition, the book compares these modeling methods with other traditional separation systems and covers fouling and concentration polarization problems. The book is a key reference for R&D managers interested in the development of membrane technologies as well as academic researchers and postgraduate students working in the wider areas of strategic treatments, separation and purification processes. Includes developments of membrane technologies in different applications by using CFD tools Describes CFD methods for evaluation and optimization of membrane process performance Indicates CFD method advantages over other modeling strategies for the analysis of membrane/membrane reactor processes

Handbook Of Green Materials: Processing Technologies, Properties And Applications (In 4 Volumes) - Oksman Kristiina 2014-04-11

Green materials and green nanotechnology have gained widespread interest over the last 15 years; first in academia, then in related industries in the last few years. The Handbook of Green Materials serves as reference literature for undergraduates and graduates studying materials science and engineering, composite materials, chemical engineering, bioengineering and materials physics; and for researchers, professional engineers and consultants from polymer or forest industries who encounter biobased nanomaterials, bionanocomposites, self- and direct-assembled nanostructures and green composite materials in their lines of work. This four-volume set contains material ranging from basic, background information on the fields discussed, to reports on the latest research and industrial activities, and finally the works by contributing authors who are prominent experts of the subjects they address in this set. The four volumes comprise of: The first volume explains the structure of cellulose; different sources of raw material; the isolation/separation processes of nanomaterials from different material sources; and properties and characteristics of cellulose nanofibers and nanocrystals (starch nanomaterials). Information on the different characterization methods and the most important properties of biobased nanomaterials are also covered. The industrial point of view regarding both the processability and access of these nanomaterials, as well as large scale manufacturing and their industrial application is discussed – particularly in relation to the case of the paper industry. The second volume expounds on different bionanocomposites based on cellulose nanofibers or nanocrystals and their preparation/manufacturing processes. It also provides information on different characterization methods and the most important properties of bionanocomposites, as well as techniques of modeling the mechanical properties of nanocomposites. This volume presents the industrial point of view regarding large scale manufacturing and their applications from the perspective of their medical uses in printed electronics and in adhesives. The third volume deals with the ability of bionanomaterials to self-assemble in either liquids or forming organized solid materials. The chemistry of cellulose nanomaterials and chemical modifications as well as different assembling techniques and used characterization methods, and the most important properties which can be achieved by self-assembly, are described. The chapters, for example, discuss subjects such as ultra-light biobased aerogels based on cellulose and chitin, thin films suitable as barrier layers, self-sensing nanomaterials, and membranes for water purification. The fourth volume reviews green composite materials – including green raw materials – such as biobased carbon fibers, regenerated cellulose fibers and thermoplastic and thermoset polymers (e.g. PLA, bio-based polyolefines, polysaccharide polymers, natural

rubber, bio-based polyurethane, lignin polymer, and furfurylalcohol). The most important composite processing technologies are described, including: prepregs of green composites, compounding, liquid composite molding, foaming, and compression molding. Industrial applications, especially for green transportation and the electronics industry, are also described. This four-volume set is a must-have for anyone keen to acquire knowledge on novel bionanomaterials – including structure-property correlations, isolation and purification processes of nanofibers and nanocrystals, their important characteristics, processing technologies, industrial up-scaling and suitable industry applications. The handbook is a useful reference not only for teaching activities but also for researchers who are working in this field.

Smart Nanocontainers - Phuong Nguyen Tri 2019-11-08

Smart Nanocontainers explores the fundamental concepts and emerging applications of nanocontainers in biomedicine, pharmaceuticals and smart materials. In pharmaceuticals, nanocontainers have advantages over their micro-counterparts, including more efficient drug detoxification, higher intracellular uptake, better stability, less side effects and higher biocompatibility with tissue and cells. In materials science, such as coating technology, they help by making coatings smarter, stronger and more durable. This important reference will help anyone who wants to learn more on how nanocontainers are used to provide the controlled release of active agents, including their applications in smart coatings, corrosion, drug delivery, diagnosis, agri-food and gas storage. Discusses how the molecular design of nanocarriers can be optimized to increase performance Explores how nanocarriers are being used to produce a new generation of active coatings Explains how nanocarriers are being used to deliver more effective nanoscale drug delivery

Membrane Processes in Separation and Purification - J.G. Crespo 2013-11-11

The chapters of this book are based upon lectures presented at the NATO Advanced Study Institute on Membrane Processes in Separation and Purification (March 21 - April 2, 1993, Curia, Portugal), organized as a successor and update to a similar Institute that took place 10 years ago (p.M. Bungay, H.K. Lonsdale, M.N. de Pinho (Eds.): Synthetic Membranes: Science, Engineering and Applications, NATO ASI Series, Reidel, Dordrecht, 1986). The decade between the two NATO Institutes witnesses the transition from individually researched membrane processes to an applied and established membrane separation technology, as is reflected by the contents of the corresponding proceeding volumes. By and large, the first volume presents itself as a textbook on membrane processes, still valid, while the present volume focuses on areas of separation need as amenable to membrane processing: Biotechnology and Environmental Technology. Accordingly, the contributions to this volume are grouped into "Membranes in Biotechnology" (11 papers), "Membranes in Environmental Technology" (6 papers), and "New Concepts" (4 papers). This is followed by one contribution each on "Energy Requirements" and "Education", i.e., membrane processes within an academic curriculum. The book thus amounts to a state of the art of applied membrane processing and may well augment the more fundamental approach of its predecessor.

Nanocomposite Structures and Dispersions - Ignac Capek 2006-09-19

Nanocomposite Structures and Dispersions summarizes the fundamentals and mechanistic approaches in preparation and characterization of colloidal nanoparticles and dispersions, providing the readers a systematic and coherent picture of the field. The book serves as an introduction to the interesting field of nanoscience based on polymer and metal colloidal nanoparticles, and also

presents the basic knowledge of polymer colloids preparation. It places a special emphasis on polymer, inorganic and metal nanomaterials classified as nanoparticles, nanocrystals, nanorods, nanotubes, nanobelts, etc. deals with the chemistry of the reaction approaches by which polymer and metal particles are synthesized. The book explores both organic (synthetic and natural) and inorganic materials, as well as their hybrids. It describes in detail terms, definitions, theories, experiments, and techniques dealing with synthesis of polymer and metal particles. It also discusses a variety of synthetic approaches including emulsion, miniemulsion and microemulsion approaches, homogeneous and heterogeneous nucleation approaches under mild and high temperatures. There is also a chapter on modification and passivation of colloidal particles. This book would be of interest to chemical engineers, polymer chemists, organic chemists, colloid chemists, materials scientists and nanotechnologists. Although the text discusses nanoscience and nanotechnology from the viewpoint of a chemist, it would also appeal to those just entering the field and experts seeking information in other sub-fields. Serves as a general introduction for those just entering the field and experts seeking information in other sub-fields Variety of synthetic approaches is described including emulsion, miniemulsion and microemulsion approaches, homogeneous and heterogeneous nucleation approaches under mild and high temperatures Focused on both the organic (synthetic and natural) and inorganic materials, and their hybrids

Colloid Chemistry - Clemens K. Weiss 2019-01-15

This book is a printed edition of the Special Issue "Colloid Chemistry" that was published in Gels

Characterization of Liquids, Nano- and Microparticulates, and Porous Bodies using Ultrasound - Andrei S. Dukhin 2002-09-03

Two key words define the scope of this book: 'ultrasound' and 'colloids'. Historically, there has been little real communication between disciples of these two fields. Although there is a large body of literature devoted to ultrasound phenomenon in colloids, there is little recognition that such phenomena may be of real importance for both the development, and application, of Colloid Science. From the other side, colloid scientists have not embraced acoustics as an important tool for characterizing colloids. The lack of any serious dialogue between these scientific fields is the biggest motivation behind this book. For colloidal systems, ultrasound provides information on three important areas of particle characterization: Particle sizing, Rheology, and Electrokinetics. This book primarily targets scientists who consider colloids as their major object of interest. As such we emphasize those aspects of acoustics that are important for colloids, and thereby neglect many others. On the other hand, scientists working with ultrasound who are already familiar with the subject will find several important new developments.

Fluid Interfaces - Eduardo Guzmán 2021-03-02

Fluid interfaces are promising candidates for confining different types of materials, e.g., polymers, surfactants, colloids, and even small molecules, to be used in designing new functional materials with reduced dimensionality. The development of such materials requires a deepening of the physicochemical bases underlying the formation of layers at fluid interfaces as well as on the characterization of their structures and properties. This is of particular importance because the constraints associated with the assembly of materials at the interface lead to the emergence of equilibrium and features of dynamics in the interfacial systems, which are far removed from those conventionally found in

traditional materials. This Special Issue is devoted to studies on the fundamental and applied aspects of fluid interfaces, and attempts to provide a comprehensive perspective on the current status of the research field.

THERMAL DESALINATION PROCESSES - Volume II - 2010-09-19

Thermal Desalination Processes is a component of Encyclopedia of Water Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. These volumes discuss matters of great relevance to our world on desalination which is a critically important as clearly the only possible means of producing fresh water from the sea for many parts of the world. The two volumes present state-of-the art subject matter of various aspects of Thermal desalination processes such as: Multi-Stage Flash evaporation (MSF) and Multi Effect Distillation (MED) and Mechanical / Thermal Vapor Compression, in addition to the Hybrid Desalination Systems. Chemical Dosing For Desalination; Control Scheme of the Plants; Steady-State Model; Steady-State Simulation; Dynamic Model; Economics and Performance of Desalination Plants. These volumes are aimed at the following five major target audiences: University and College Students Educators, Professional Practitioners, Research Personnel and Policy and Decision Makers.

Handbook of Industrial Membranes - K. Scott 1995-12-20

This manual contains necessary and useful information and data in an easily accessible format relating to the use of membranes. Membranes are among the most important engineering components in use today, and each year more and more effective uses for membrane technologies are found - for example: water purification, industrial effluent treatment, solvent dehydration by pervaporation, recovery of volatile organic compounds, protein recovery, bioseparations and many others. The pace of change in the membrane industry has been accelerating rapidly in recent years, occasioned in part by the demand of end-users, but also as a result of the investment in R&D by manufacturers. To reflect these changes the author has obtained the latest information from some of the leading suppliers in the business. In one complete volume this unique handbook gives practical guidance to using selected membrane processes in individual industries while also providing a useful guide to equipment selection and usage.

MEMBRANE PROCESSES - Volume II - 2010-11-05

Membrane Processes is a component of Encyclopedia of Water Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. These volumes discuss matters of great relevance to our world on desalination which is a critically important as clearly the only possible means of producing fresh water from the sea for many parts of the world. The two volumes present state-of-the art subject matter of various aspects of Membrane Processes such as: History And Current Status Of Membrane Desalination Processes; Membrane Science And Reclamation; Membrane Characterization; Principles And Practices Of Reverse Osmosis; Reverse Osmosis: Introduction; Hollow-Fiber Membranes; Preparation And Characterization Of Ionexchange Membranes; Preparation And Characterization Of Micro- And Ultrafiltration Membranes; Membrane Distillation; Desalination By Membrane Distillation; Pervaporation; Dialysis And Diffusion Dialysis; Donnan Dialysis; Modeling And Calculation Of Pressure-Driven Membrane Processes; Survey Of Theoretical Approaches To Modeling; Pressure-Driven Membrane Processes (Submodels For Transport In Phases); Reverse Osmosis Process And System Design; Practical Aspects Of Large-Scale Reverse Osmosis Applications; Health, Safety And Environmental Considerations; Membrane Separation Technologies;

Concentration Of Liquid Foods; Mass Transfer Operation–Membrane Separations; Mass Transfer Operations: Hybrid Membrane Processes; Recent Advances In Membrane Science And Technology In Seawater Desalination – With Technology Development In The Middle East And Singapore. These volumes are aimed at the following five major target audiences: University and College Students Educators, Professional Practitioners, Research Personnel and Policy and Decision Makers

Colloid and Surface Chemistry - E.D. Shchukin 2001-12-19

This book covers major areas of modern Colloid and Surface Science (in some countries also referred to as Colloid Chemistry) which is a broad area at the intersection of Chemistry, Physics, Biology and Material Science investigating the disperse state of matter and surface phenomena in disperse systems. The book arises of and summarizes the progress made at the Colloid Chemistry Division of the Chemistry Department of Lomonosov Moscow State University (MSU) over many years of scientific, pedagogical and methodological work. Throughout the book the presentation of fundamental theoretical and experimental approaches and results is combined with discussion of general scientific basis of their role in nature and applications in various technological processes.

Interfacial Separation of Particles - Shouci Lu 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

Handbook of Surface and Colloid Chemistry - K. S. Birdi 2015-06-25

This new edition of the Handbook of Surface and Colloid Chemistry informs you of significant recent developments in the field. It highlights new applications and provides revised insight on surface and colloid chemistry's growing role in industrial innovations. The contributors to each chapter are internationally recognized experts. Several chapter

Chemical Engineering and Chemical Process Technology - Volume II - Ryzhard Pohorecki 2010-11-30

Chemical Engineering and Chemical Process Technology is a theme component of Encyclopedia of Chemical Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty Encyclopedias. Chemical engineering is a branch of engineering, dealing with processes in which materials undergo changes in their physical or chemical state. These changes may concern size, energy content, composition and/or other application properties. Chemical engineering deals with many processes belonging to chemical industry or related industries

(petrochemical, metallurgical, food, pharmaceutical, fine chemicals, coatings and colors, renewable raw materials, biotechnological, etc.), and finds application in manufacturing of such products as acids, alkalis, salts, fuels, fertilizers, crop protection agents, ceramics, glass, paper, colors, dyestuffs, plastics, cosmetics,

vitamins and many others. It also plays significant role in environmental protection, biotechnology, nanotechnology, energy production and sustainable economical development. The Theme on Chemical Engineering and Chemical Process Technology deals, in five volumes and covers several topics such as: Fundamentals of Chemical Engineering; Unit Operations – Fluids; Unit Operations – Solids; Chemical Reaction Engineering; Process Development, Modeling, Optimization and Control; Process Management; The Future of Chemical Engineering; Chemical Engineering Education; Main Products, which are then expanded into multiple subtopics, each as a chapter. These five volumes are aimed at the following five major target audiences: University and College students Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

Stable Gas-in-Liquid Emulsions - Joseph D'Arrigo 2011-06-02

Certain stable lipid nanoemulsions, existing in natural waters and certain artificial media, display - upon intravenous injection - a marked capability for rapid active targeting, both to tumors and to certain lesion sites. This category of lipid nanoemulsions contains no phospholipids, no proteins nor peptides, no carbohydrates, and no chemical modification of the lipophilic drugs is required; consequently it avoids various past problems reported for earlier versions of targeted nanoemulsions. The book covers in detail the underlying chemical and biochemical principles of stable lipid nanoemulsions as well as many current and potential applications in nanomedicine such as targeted chemotherapy. It is in harmony with goals of the current US National Nanotechnology Initiative, which include nanomedical approaches to drug delivery that focus on developing nanoscale particles to improve drug bioavailability i.e. often using targeted nanoparticles for delivering drugs with cell precision and less side effects. Despite the obvious practical importance to various fields including nanomedicine there is currently no comprehensive book available in the literature. The proposed book will effectively fill this gap. Detailed coverage of the underlying chemical and biochemical principles of stable lipid nanoemulsions. The book includes many current and potential applications in nanomedicine such as targeted chemotherapy. Contains 67 figures (including 13 microscope photos) and 26 tables Over 1200 literature references, many of them of very recent date.

Colloidal Particles at Liquid Interfaces - Bernard P. Binks 2006-08-17

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 understanding of how these particles operate in such systems is minimal. This book brings together the diverse topics actively being investigated, with contributions from leading experts in the field. After an introduction to the basic concepts and principles, the book divides into two sections. The first deals with particles at planar liquid interfaces, with chapters of an experimental and theoretical nature. The second concentrates on the behaviour of particles at curved liquid interfaces, including particle-stabilized foams and emulsions and new materials derived from such systems. This collection will be of interest to academic researchers and graduate students in chemistry, physics, chemical engineering, pharmacy, food science and materials science.

Complex Wave Dynamics on Thin Films - Hen-hong Chang 2002-03-14

Wave evolution on a falling film is a classical hydrodynamic instability whose rich wave dynamics have been carefully recorded in the last fifty years. Such waves are known to profoundly affect the mass and heat transfer of multi-phase

industrial units. This book describes the collective effort of both authors and their students in constructing a comprehensive theory to describe the complex wave evolution from nearly harmonic waves at the inlet to complex spatio-temporal patterns involving solitary waves downstream. The mathematical theory represents a significant breakthrough from classical linear stability theories, which can only describe the inlet harmonic waves and also extends classical soliton theory for integrable systems to real solitary wave dynamics with dissipation. One unique feature of falling-film solitary wave dynamics, which drives much of the spatio-temporal wave evolution, is the irreversible coalescence of such localized wave structures. It represents the first full description of a hydrodynamic instability from inception to developed chaos. This approach should prove useful for other complex hydrodynamic instabilities and would allow industrial engineers to better design their multi-phase apparatus by exploiting the deciphered wave dynamics. This publication gives a comprehensive review of all experimental records and existing theories and significantly advances state of the art on the subject and are complimented by complex and attractive graphics from computational fluid mechanics.

MEMBRANE PROCESSES - Volume III - 2010-11-05

Membrane Processes is a component of Encyclopedia of Water Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. These volumes discuss matters of great relevance to our world on desalination which is a critically important as clearly the only possible means of producing fresh water from the sea for many parts of the world. The two volumes present state-of-the art subject matter of various aspects of Membrane Processes such as: History And Current Status Of Membrane Desalination Processes; Membrane Science And Reclamation; Membrane Characterization; Principles And Practices Of Reverse Osmosis; Reverse Osmosis: Introduction; Hollow-Fiber Membranes; Preparation And Characterization Of Ionexchange Membranes; Preparation And Characterization Of Micro- And Ultrafiltration Membranes; Membrane Distillation; Desalination By Membrane Distillation; Pervaporation; Dialysis And Diffusion Dialysis; Donnan Dialysis; Modeling And Calculation Of Pressure-Driven Membrane Processes; Survey Of Theoretical Approaches To Modeling; Pressure-Driven Membrane Processes (Submodels For Transport In Phases); Reverse Osmosis Process And System Design; Practical Aspects Of Large-Scale Reverse Osmosis Applications; Health, Safety And Environmental Considerations; Membrane Separation Technologies;

Concentration Of Liquid Foods; Mass Transfer Operation—Membrane Separations; Mass Transfer Operations: Hybrid Membrane Processes; Recent Advances In Membrane Science And Technology In Seawater Desalination – With Technology Development In The Middle East And Singapore. These volumes are aimed at the following five major target audiences: University and College Students Educators, Professional Practitioners, Research Personnel and Policy and Decision Makers

Introduction to Molecular-Microsimulation for Colloidal Dispersions - A. Satoh
2003-06-20

Introduction to Molecular-Microsimulation for Colloidal Dispersions provides an introduction to molecular-microsimulation methods for colloidal dispersions and is suitable for both self-study and reference. It provides the reader with a systematic understanding of the theoretical background to simulation methods, together with a wide range of practical skills for developing computational programs. Exercises are included at the end of each chapter to further assist the understanding of the subjects addressed. Provides the reader with the theoretical background to molecular-microsimulation methods Suitable for both self-study and reference Aids the reader in developing programs to meet their own requirements

Transport Processes in Bubbles, Drops and Particles - Daniel DeKee 2002-06-14

Describes the advances in the transport phenomena of particles, drops and bubbles in complex fluids. This book contains contributions from experts in areas such as particle deposition in membranes, flow of granular mixtures, food suspensions, foams, electro kinetic and thermo capillary driven flows, and two-phase flows.

Surfactants: Chemistry, Interfacial Properties, Applications - D. Möbius
2001-12-21

This publication provides comprehensive material on the chemical and physical attributes of surfactants and new models for the understanding of structure-property relationships. Surfactants Chemistry, Interfacial Properties, Applications provides efficient instruments for the prognostication of principal physicochemical properties and the technologic applicability from the structure of a surfactant through the discussion of interrelations between the chemical structure, physicochemical properties and the efficiency of technologic application. Also included are informative overviews on new experimental techniques and abundant reference material on manufacturers, nomenclature, product properties, and experimental examples. The publication is accompanied by a CD-ROM, which is needed for the application of the thermodynamic and kinetic models to experimental data.