Where To Download The Physics Of Microdroplets Hardcover 2012 By Jean Berthier Read Pdf Free

The Physics of Microdroplets Open Microfluidics Microdroplet Technology Microdroplets Advancement in Newtonian and Non-Newtonian Microfluidic Multiphase System Microdroplet Technology Labs on Chip Global Atmospheric Phenomena Involving Water Microfluidics and Nanofluidics Biosensors and Nanotechnology The Airborne Microparticle Open-Channel Microfluidics Optical Processes in Microcavities Optical Processes in Microcavities Some Optical Measurements on Gel Microdroplets Japanese Journal of Applied Physics Low Temperature Physics and Chemistry Soviet Journal of Plasma Physics Low Temperature Physics & Chemistry Climate and Weather of the Sun-Earth System (CAWSES) The XVth International Conference on Low Temperature Physics, Grenoble, 23-29 Août 1978 The XVth International Conference on Low Temperature Physics, Grenoble, 23-29 Août 1978: Quantum fluids and solids. Superconductivity Physics, Uspekhi The Airborne Microparticle Liquid Crystal Colloids Handbook of Optofluidics Optical MEMS, Nanophotonics, and Their Applications Optical Processes in Microparticles and Nanostructures Advances in Atomic, Molecular, and Optical Physics Fundamentals and Applications in Aerosol Spectroscopy The Physics of Ferroelectric and Antiferroelectric Liquid Crystals Transport and Mixing in Laminar Flows Microdrops and Digital Microfluidics Electrochemistry of Immobilized Particles and Droplets Liquid Crystals: Frontiers in Biomedical Applications Recent Advances in Spray Combustion The Journal of Chemical Physics Optical Fiber Sensing Technologies Polymerization Global Energetics of the Atmosphere Introduction to Nanophotonics

This book is an extensive yet self-contained reference of single microparticle studies as they have been performed for many years by the authors. With the range of theoretical and experimental tools available it has become possible to use the many unique properties of droplets and small particles to investigate phenomena as diverse as, linear and nonlinear optics, solution thermodynamics, gas/solid and gas/liquid chemical reactions, transport properties such as gas phase diffusion coefficients,

rate processes in the continuum and non-continuum regimes, trace gas uptake by aerosol droplets related to atmospheric chemistry and ozone depletion, phoretic phenomena, Raman spectroscopy, particle charge, evaporation and condensation processes. Throughout the book the main concern of the authors was to provide the reader with a visualization of the significance and application of the theory by experimental results. This book presents the basic physics of ferroelectric and antiferroelectric liquid crystals in a simple and transparent way. It treats both the basic and the applied aspects of ferroelectric and antiferroelectric liquid crystal research, starting from the discovery of ferroelectricity in liquid crystals in 1975 and ending with the resonant X-ray experiment in ferrielectric and antiferrielectric phases in 1998. Particular attention is paid to the optical properties, electrooptic effects, phase transitions and experimental methods used in liquid crystal research. Special chapters are devoted to dielectric spectroscopy, light scattering, NMR, STM and AFM in complex fluids. The more than 300 illustrations help to present the basic physics of liquid crystalline ferroelectrics and antiferroelectrics in a way that can be easily followed by students, engineers and scientists dealing with liquid crystal research. Contents:Symmetry, ferroelectricity and antiferroelectricity in liquid crystalsChiral phases of achiral moleculesBroken symmetry and elementary excitationsLandau theory of ferroelectric and antiferroelectric liquid crystalsOrder parameter dynamics, soft modes and gapless phasonsFerroelectric liquid crystals in external magnetic and DC electric fieldsPhase transitions in thin cellsSurface-induced polaritySoliton and plane wave dynamics in thin cellsFreely suspended filmsLinear optics of helical structuresBirefringence, optical rotation and quasielastic light scattering in ferroelectric and antiferrolectric phasesLinear electrooptic response of ferroelectric and antiferroelectric liquid crystalsMagnetic-field induced biaxialityDielectric dispersionSoft and phase mode dynamicsDielectric response of a multisoliton latticePolarization noiseDeuteron NMR in ferroelectric and antiferroelectric liquid crystalsAnisotropy of the critical magnetic fieldPolar and quadrupolar biasing of molecular rotation around the long molecular axis14N NQR and 13C NMR in tilted smectic phasesSynclinic versus anticlinic ordering in tilted smecticsOrder parameter dynamics and a doubling of a

smectic unit cell in antiferroelectric liquid crystalsOptical properties of the antiferroelectric phaseDielectric, linear and nonlinear electrooptic response of the antiferroelectric phaseFerroelectricity, antiferroelectricity and intermediate phasesDiscrete models of intermediate phasesSTM and AFM in complex liquidsSurface stabilized ferroelectric liquid crystal displaysUltrafast electroclinic effectDeformed helix mode ferroelectric displaysChevrons in SSFC displaysIon-director coupling and depolarization field in SSFLCDLandau theory of second order phase transitionsSurvey of different experimental methodsNuts and bolts collection Readership: Graduate students, engineers and scientists dealing with liquid crystals and optical display. keywords:Liquid Crystals;Soft Matter;Ferroelectricity;Antiferroelectricity;Ferroelectric;Antiferroelectric;Phase Transitions;Optics;High Magnetic Fields;Solitons;Light Scattering;Displays "… this is an excellent and comprehensive book, especially for those who prefer a more formal treatment of the topics … Because many of the topics apply to nonferroelectric liquid crystals as well, I believe that this book has an important place on the shelf of anybody who deals with liquid crystals; it is also an absolute 'must' for anybody who works on FLCs and AFLCs." Charles Rosenblatt Case Western Reserve University "The structure of the book is extremely logical and has been well thought out … The real strength of the book is in the clear and concise explanations the authors give of many aspects of underlying theory and the implications of various experimental results. Many of the discussions of conflicting data and ideas are also presented in an unbiased way. This makes the book eminently readable, not only as a resource for advanced researchers in the area, but also as a first introduction for new graduate students … This is an essential reference work and should occupy a place on all liquid-crystal bookcases." Journal of Applied Crystallography Helping you better understand the processes, instruments, and methods of aerosol spectroscopy, Fundamentals and Applications in Aerosol Spectroscopy provides an overview of the state of the art in this rapidly developing field. It covers fundamental aspects of aerosol spectroscopy, applications to atmospherically and astronomically relevant problems, and several aspects that need further research and development. Chapters in the book are arranged in order of decreasing wavelength of the light/electrons. The text starts with infrared spectroscopy, one

of the most important aerosol characterization methods for laboratory studies, field measurements, remote sensing, and space missions. It then focuses on Raman spectroscopy for investigating aerosol processes in controlled laboratory studies and for analyzing environmental particles and atmospheric pollution. The next section discusses the use of cavity ring-down spectroscopy to measure light extinction, laser-induced fluorescence spectroscopy to identify and classify biological aerosol particles, and ultrafast laser techniques to improve the specificity of bioaerosol detection. The final section examines recent developments involving novel techniques based on UV, x-ray, and electron beam studies. This book offers the first comprehensive overview of the spectroscopy of aerosols. It includes some results for the first time in the literature and presents a unique link between fundamental aspects and applications. Provides a broad range of information from basic principles to advanced applications of biosensors and nanomaterials in health care diagnostics This book utilizes a multidisciplinary approach to provide a wide range of information on biosensors and the impact of nanotechnology on the development of biosensors for health care. It offers a solid background on biosensors, recognition receptors, biomarkers, and disease diagnostics. An overview of biosensor-based health care applications is addressed. Nanomaterial applications in biosensors and diagnostics are included, covering the application of nanoparticles, magnetic nanomaterials, quantum dots, carbon nanotubes, graphene, and molecularly imprinted nanostructures. The topic of organ-specific health care systems utilizing biosensors is also incorporated to provide deep insight into the very recent advances in disease diagnostics. Biosensors and Nanotechnology: Applications in Health Care Diagnostics is comprised of 15 chapters that are presented in four sections and written by 33 researchers who are actively working in Germany, the United Kingdom, Italy, Turkey, Denmark, Finland, Romania, Malaysia and Brazil. It covers biomarkers in healthcare; microfluidics in medical diagnostics; SPR-based biosensor techniques; piezoelectric-based biosensor technologies; MEMS-based cell counting methods; lab-on-chip platforms; optical applications for cancer cases; and more. Discusses the latest technology and advances in the field of biosensors and their applications for healthcare diagnostics Particular focus on biosensors for cancer Summarizes research of

the last 30 years, relating it to state-of-the-art technologies Biosensors and Nanotechnology: Applications in Health Care Diagnostics is an excellent book for researchers, scientists, regulators, consultants, and engineers in the field, as well as for graduate students studying the subject. With recent advancement in droplet microfluidics for both microdroplet encapsulation and fission, it is of paramount importance to understand the flow physics for both Newtonian and non-Newtonian fluids in microdroplet encapsulation and fission as the development of the field is approaching to its maturity. The chapter aims to review and discuss the fluid flow behavior of the multiphase system, mathematical models as well as the fundamental phenomena driving force of microdroplet encapsulation and fission multiphase system. Together, the recent advances in technologies that enable fabrication and application of droplets encapsulation and fission from both Newtonian and non-Newtonian microfluidic multiphase system will be reviewed as well. Optofluidics is an emerging field that involves the use of fluids to modify optical properties and the use of optical devices to detect flowing media. Ultimately, its value is highly dependent on the successful integration of photonic integrated circuits with microfluidic or nanofluidic systems. Handbook of Optofluidics provides a snapshot of the s In the present book, various applications of microfluidics and nanofluidics are introduced. Microfluidics and nanofluidics span a broad array of disciplines including mechanical, materials, and electrical engineering, surface science, chemistry, physics and biology. Also, this book deals with transport and interactions of colloidal particles and biomolecules in microchannels, which have great importance to many microfluidic applications, such as drug delivery in life science, microchannel heat exchangers in electronic cooling, and food processing industry. Furthermore, this book focuses on a detailed description of the thermal transport behavior, challenges and implications that involve the development and use of HTFs under the influence of atomistic-scale structures and industrial applications. Optical Fiber Sensing Technologies/ b Explore foundational and advanced topics in optical fiber sensing technologies In Optical Fiber Sensing Technologies: Principles, Techniques, and Applications, a team of distinguished researchers delivers a comprehensive overview of all critical aspects of optical fiber sensing devices, systems,

and technologies. The book moves from the basic principles of the technology to innovation methods and a broad range of applications, including Bragg grating sensing technology, intra-cavity laser gas sensing technology, optical coherence tomography, distributed vibration sensing, and acoustic sensing. The accomplished authors bridge the gap between innovative new research in the field and practical engineering solutions, offering readers an unmatched source of practical, application-ready knowledge. Ideal for anyone seeking to further the boundaries of the science of optical fiber sensing or the technological applications for which these techniques are used, Optical Fiber Sensing Technologies: Principles, Techniques, and Applications also includes: Thorough introductions to optical fiber and optical devices, as well as optical fiber Bragg grating sensing technology Practical discussions of Extrinsic-Fabry-Perot-Interferometer-based optical fiber sensing technology, acoustic sensing technology, and high-temperature sensing technology Comprehensive explorations of assemble free micro-interferometer-based optical fiber sensing technology In-depth examinations of optical fiber intra-cavity laser gas sensing technology Perfect for applied and semiconductor physicists, Optical Fiber Sensing Technologies: Principles, Techniques, and Applications is also an invaluable resource for professionals working in the semiconductor, optical, and sensor industries, as well as materials scientists and engineers for measurement and control. It has been thirty years since one of the authors (EJD) began a collaboration with Professor Milton Kerker at Clarkson University in Potsdam, New York using light scattering methods to study aerosol processes. The development of a relatively short-lived commercial particle levitator based on a modification of the Millikan oil drop experiment attracted their attention and led the author to the study of single droplets and solid microparticles by levitation methods. The early work on measurements of droplet evaporation rates using light scattering techniques to determine the size slowly expanded and diversified as better instrumentation was developed, and faster computers made it possible to perform Mie theory light scattering calculations with ease. Several milestones can be identified in the progress of single microparticle studies. The first is the introduction of the electrodynamic balance, which provided more robust trapping of a particle. The electrodynamic levitator, which has played an

important role in atomic and molecular ion spectroscopy, leading to the Nobel Prize in Physics in 1989 shared by Wolfgang Paul of Bonn University and Hans Dehmelt of the University of Washington, was easily adapted to trap microparticles. Simultaneously, improvements in detectors for acquiring and storing light scattering data and theoretical and experimental studies of the interesting optical properties of microspheres, especially the work on morphology dependent resonances by Arthur Ashkin at the Bell Laboratories, Richard Chang, from Yale University, and Tony Campillo from the Naval Research Laboratories in Washington D. C. This volume of Advances in Atomic, Molecular, and Optical Physics celebrates and honors the work and life of Professor Herbert Walther. Areas of emphasis include quantum optics, in general, and BEC, atomic coherence, quantum interference, etc. in particular. Pulls vast amount of information together in cohesive, easy to understand manner Written by people who know and are familiar with Herbert Walther's work Comprehensive articles New developments This book covers device design fundamentals and system applications in optical MEMS and nanophotonics. Expert authors showcase examples of how fusion of nanoelectromechanical (NEMS) with nanophotonic elements is creating powerful new photonic devices and systems including MEMS micromirrors, MEMS tunable filters, MEMS-based adjustable lenses and apertures, NEMS-driven variable silicon nanowire waveguide couplers, and NEMS tunable photonic crystal nanocavities. The book also addresses system applications in laser scanning displays, endoscopic systems, space telescopes, optical telecommunication systems, and biomedical implantable systems. Presents efforts to scale down mechanical and photonic elements into the nano regime for enhanced performance, faster operational speed, greater bandwidth, and higher level of integration. Showcases the integration of MEMS and optical/photonic devices into real commercial products. Addresses applications in optical telecommunication, sensing, imaging, and biomedical systems. Prof. Vincent C. Lee is Associate Professor in the Department of Electrical and Computer Engineering, National University of Singapore. Prof. Guangya Zhou is Associate Professor in the Department of Mechanical Engineering at National University of Singapore. This book comprises the contributions of several authors in the area of polymer characterization by atomic force microscopy of the polymer network structure formed in Ferroelectric Liquid

Crystals Cells; polymerization by microwave irradiation method of starch/acrylic acid/acrylamide; polymerization of olefins; emulsion polymerization; ring opening polymerization; cationic polymerization of vinyl monomers ; block and graft copolymerization by controlled/living polymerization; fabrication of doped microstructures by two-photon polymerization; rheology of biomaterials; plant cell wall polymers; polyADP-Ribosylation in postfertilization and genome reprogramming . We hope that this book will help inspire readers to pursue study and research in this field. This book looks at global atmospheric processes from a physical standpoint using available current and past observational data taken from measurements of relevant atmospheric parameters. It describes various aspects of the current atmospheric state and its future evolution, focusing primarily on the energetic balance of the Earth and atmosphere, and taking into consideration the multi-faceted global equilibrium between these two systems, carbon, and water. The analysis presented in this book restricts itself to those objects and processes that allow us to obtain reliable conclusions and numerical estimations, in contrast to current climate models with much larger numbers of parameters for describing the same problems. As a result, in spite of the roughness of numerical parameters, the book unveils a reliable and transparent physical picture of energetic phenomena in the global atmosphere. In particular, it shows that approximately only one-fourth of atmospheric water returns from the atmosphere to the Earth in the form of free molecules. It was shown that the contemporary warming of our planet has an anthropogenic character, and that the average global temperature increases due to an increase of the concentration of atmospheric CO2 molecules, via an increase in atmospheric moisture, as well as an increase in the amount of aerosols in the atmosphere. Accumulation of atmospheric carbon dioxide plays a subsidiary role in this process and gives approximately one-third in a change of the global temperature, while an increase in the amount of atmospheric water by as little as only 0.3% per year explains the observed warming of the Earth. The book shows how the greenhouse instability of the atmosphere evidently has its origins in the Eocene epoch, presenting an analysis of the influence of various types of global energetic processes on the climate that differs from the official stance on these problems. Microdroplet technology has recently emerged to provide new and

diverse applications via microfluidic functionality, especially in various areas of biology and chemistry. This book, then, gives an overview of the principle components and wide-ranging applications for state-of-the-art of droplet-based microfluidics. Chapter authors are internationally-leading researchers from chemistry, biology, physics and engineering that present various key aspects of micrdroplet technology -- fundamental flow physics, methodology and components for flow control, applications in biology and chemistry, and a discussion of future perspectives. This book acts as a reference for academics, post-graduate students, and researcher wishing to deepen their understand of microfluidics and introduce optimal design and operation of new droplet-based microfluidic devices for more comprehensive analyte assessments. The Physics of Microdroplets gives the reader the theoretical and numerical tools to understand, explain, calculate, and predict the often nonintuitive observed behavior of droplets in microsystems. Microdrops and interfaces are now a common feature in most fluidic microsystems, from biology, to biotechnology, materials science, 3D-microelectronics, optofluidics, and mechatronics. On the other hand, the behavior of droplets and interfaces in today's microsystems is complicated and involves complex 3D geometrical considerations. From a numerical standpoint, the treatment of interfaces separating different immiscible phases is difficult. After a chapter dedicated to the general theory of wetting, this practical book successively details: The theory of 3D liquid interfaces The formulas for volume and surface of sessile and pancake droplets The behavior of sessile droplets The behavior of droplets between tapered plates and in wedges The behavior of droplets in microchannels The effect of capillarity with the analysis of capillary rise The onset of spontaneous capillary flow in open microfluidic systems The interaction between droplets, like engulfment The theory and application of electrowetting The state of the art for the approach of 3D-microelectronics using capillary alignment This book brings together the many concepts and discoveries in liquid crystal colloids contributed over the last twenty years and scattered across numerous articles and book chapters. It provides both a historical overview of the development of the field and a clear perspective on the future applications in photonics. The book covers all phenomena observed in liquid crystal colloids with an emphasis on experimental tools and

applications of topology in condensed matter, as well as practical micro-photonics applications. It includes a number of spectacular manifestations of new topological phenomena not found or difficult to observe in other systems. Starting from the early works on nematic colloids, it explains the basics of topological defects in ordered media, charge and winding, and the elastic forces between colloidal particles in nematics. Following a detailed description of experimental methods, such as optical tweezing and particle tracking, the book eases the reader into the theoretical part, which deals with elastic deformation of nematic liquid crystals due to inclusions and surface alignment. This is discussed in the context of basic mean field Landau-de Gennes Q-tensor theory, with a brief explanation of the free-energy minimization numerical methods. There then follows an excursion into the topology of complex nematic colloidal structures, colloidal entanglement, knotting and linking. Nematic droplets, shells, handlebodies and chiral topological structures are addressed in separate chapters. The book concludes with an extensive chapter on the photonic properties of nematic dispersions, presenting the concept of integrated soft matter photonics and discussing the concepts of nematic and chiral nematic microlasers, surface-sensitive photonic devices and smectic microfibers. The text is complemented by a large bibliography, explanatory sketches and beautiful micrographs. The dielectric microstructures act as ultrahigh Q factors optical cavities, which modify the spontaneous emission rates and alter the spatial distributions of the input and output radiation. The editors have selected leading scientists who have made seminal contributions in different aspects of optical processes in microcavities. Every attempt has been made to unify the underlying physics pertaining to microcavities of various shapes. This book begins with a chapter on the role of microcavity modes with additional chapters on how these microcavity modes affect the spontaneous and stimulated emission rates, enhance nonlinear optical processes, used in cavity-QED and chemical physics experiments, aid in single-molecule detection, influence the design of microdisk semiconductor lasers, and how deformed cavities can be treated with classical chaos theory. Contents:The Role of Quasinormal Modes (E S-C Ching et al.)Optical Mode Density and Spontaneous Emission in Microcavities (S D Brorson & P M W Skovgaard)Very High Q Whispering-Gallery Modes in Silica

Microspheres for Cavity-QED Experiments (V Lefèvre-Seguin et al.)Molecular Fluorescence in a Microcavity: Solvation Dynamics and Single Molecule Detection (M D Barnes et al.)Cavity QED Modified Stimulated and Spontaneous Processes in Microdroplets (A J Campillo et al.)Perturbation Effects on the Resonances of a Spherical Dielectric Microcavity (M M Mazumder et al.)Nonlinear Optical Effects in Microcylinders and Microdroplets (R L Armstrong)The Role of MDRs in Chemical Physics: Intermolecular Energy Transfer in Microdroplets (S Arnold et al.)Dynamic Optical Processes in Microdisk Lasers (R E Slusher & U Mohideen)Dielectric Photonic Wells and Wires and Spontaneous Emission Coupling Efficiency of Microdisk and Photonic-Wire Semiconductor Lasers (S-T Ho et al.)Chaotic Light: A Theory of Asymmetric Resonant Cavities (J U Nöckel & A D Stone) Readership: Scientists interested in the optics of microcavities, droplets, cavity quantum electrodynamics, nonlinear optics, laser diagnostics, advanced undergraduates and graduates. keywords:Microcavity;Lasing;Whispering Gallery Mode (WGM);Morphology Dependent Resonances (MDR);Cavity Quantum Electrodynamics (CQED);Q-Factor;Microdroplets;Micro Cyclinders;Micro-Disks;Modified Emission This book provides readers from academia and industry with an up-to-date overview of important advances in the field, dealing with such fundamental fluid mechanics problems as nonlinear transport phenomena and optimal control of mixing at the micro- and nanoscale. The editors provide both in-depth knowledge of the topic as well as vast experience in guiding an expert team of authors. The review style articles offer a coherent view of the micromixing methods, resulting in a much-needed synopsis of the theoretical models needed to direct experimental research and establish engineering principles for future applications. Since these processes are governed by nonlinear phenomena, this book will appeal to readers from both communities: fluid mechanics and nonlinear dynamics. CAWSES (Climate and Weather of the Sun-Earth System) is the most important scientific program of SCOSTEP (Scientific Committee on Solar-Terrestrial Physics). CAWSES has triggered a scientific priority program within the German Research Foundation for a period of 6 years. Approximately 30 scientific institutes and 120 scientists were involved in Germany with strong links to international partners. The priority program focuses on solar influence on climate, atmospheric coupling processes, and space climatology. This book

summarizes the most important results from this program covering some important research topics from the Sun to climate. Solar related processes are studied including the evolution of solar radiation with relevance to climate. Results regarding the influence of the Sun on the terrestrial atmosphere from the troposphere to the thermosphere are presented including stratospheric ozone, mesospheric ice clouds, geomagnetic effects, and their relevance to climate. Several chapters highlight the importance of coupling mechanisms within the atmosphere, covering transport mechanisms of photochemically active species, dynamical processes such as gravity waves, tides, and planetary waves, and feedback mechanisms between the thermal and dynamical structure of the atmosphere. Special attention is paid to climate signals in the middle and upper atmosphere and their significance relative to natural variability. This book covers the role of water in global atmospheric phenomena, focussing on the physical processes involving water molecules and water microparticles. It presents the reader with a detailed look at some of the most important types of global atmospheric phenomena involving water, such as water circulation, atmospheric electricity and the greenhouse effect. Beginning with the cycle of water evaporation and condensation, and the important roles played by the nucleation and growth processes of water microdroplets, the book discusses atmospheric electricity as a secondary phenomenon of water circulation in the atmosphere, comprising a chain of processes involving water molecules and water microdroplets. Finally, the book discusses aspects of the molecular spectroscopy of greenhouse atmospheric components, showing how water molecules and water microdroplets give the main contribution to atmospheric emission in the infrared spectrum range. Featuring numerous didactic schematics and appendices detailing all necessary unit conversion factors, this book is useful to both active researchers and doctoral students working in the fields of atmospheric physics, climate science and molecular spectroscopy. Labs on Chip: Principles, Design and Technology provides a complete reference for the complex field of labs on chip in biotechnology. Merging three main areas— fluid dynamics, monolithic micro- and nanotechnology, and out-of-equilibrium biochemistry—this text integrates coverage of technology issues with strong theoretical explanations of design techniques. Analyzing each subject from basic principles to relevant

applications, this book: Describes the biochemical elements required to work on labs on chip Discusses fabrication, microfluidic, and electronic and optical detection techniques Addresses planar technologies, polymer microfabrication, and process scalability to huge volumes Presents a global view of current lab-on-chip research and development Devotes an entire chapter to labs on chip for genetics Summarizing in one source the different technical competencies required, Labs on Chip: Principles, Design and Technology offers valuable guidance for the lab-on-chip design decision-making process, while exploring essential elements of labs on chip useful both to the professional who wants to approach a new field and to the specialist who wants to gain a broader perspective. This Festschrift is a tribute to the eminent scholar, Professor Richard Kounai Chang, on his retirement from Yale University on June 12, 2008. During his over four decades of scientific exploration, Professor Chang has made a lasting contribution to the development of linear and nonlinear optics and devices in confined geometries, of surface second-harmonic generation and surface-enhanced Raman scattering, and of novel methods for detecting airborne aerosol pathogens. This volume assembles a collection of articles contributed by former students, collaborators, and colleagues of Professor Chang all over the world. The topics span a diverse scope in applied optics frontiers, many of which are rooted in Professor Chang's pioneering research. Open microfluidics, the study of microflows having a boundary with surrounding air, encompasses different aspects such as paper or thread-based microfluidics, droplet microfluidics and open-channel microfluidics. Open-channel microflow is a flow at the micro-scale, guided by solid structures, and having at least a free boundary (with air or vapor) other than the advancing meniscus. This book is devoted to the study of open-channel microfluidics which (contrary to paper or thread or droplet microfluidics) is still very sparsely documented, but bears many new applications in biology, biotechnology, medicine, material and space sciences. Capillarity being the principal force triggering an open microflow, the principles of capillarity are first recalled. The onset of open-channel microflow is next analyzed and the fundamental notion of generalized Cassie angle (the apparent contact angle which accounts for the presence of air) is presented. The theory of the dynamics of open-channel microflows

is then developed, using the notion of averaged friction length which accounts for the presence of air along the boundaries of the flow domain. Different channel morphologies are studied and geometrical features such as valves and capillary pumps are examined. An introduction to two-phase open-channel microflows is also presented showing that immiscible plugs can be transported by an open-channel flow. Finally, a selection of interesting applications in the domains of space, materials, medicine and biology is presented, showing the potentialities of open-channel microfluidics. Nanophotonics is where photonics merges with nanoscience and nanotechnology, and where spatial confinement considerably modifies light propagation and light-matter interaction. Describing the basic phenomena, principles, experimental advances and potential impact of nanophotonics, this graduate-level textbook is ideal for students in physics, optical and electronic engineering and materials science. The textbook highlights practical issues, material properties and device feasibility, and includes the basic optical properties of metals, semiconductors and dielectrics. Mathematics is kept to a minimum and theoretical issues are reduced to a conceptual level. Each chapter ends in problems so readers can monitor their understanding of the material presented. The introductory quantum theory of solids and size effects in semiconductors are considered to give a parallel discussion of wave optics and wave mechanics of nanostructures. The physical and historical interplay of wave optics and quantum mechanics is traced. Nanoplasmonics, an essential part of modern photonics, is also included. In this 2nd edition of Micro-Drops and Digital Microfluidics, Jean Berthier explores the fundamentals and applications of digital microfluidics, enabling engineers and scientists to design this important enabling technology into devices and harness the considerable potential of digital microfluidics in testing and data collection. This book describes the most recent developments in digital microfluidics, with a specific focus on the computational, theoretical and experimental study of microdrops. Unique in its emphasis on digital microfluidics and with diverse applications ranging from drug delivery to point-of-care diagnostic chips, organic synthesis to microreactors, Micro-Drops and Digital Microfluidics meets the needs of audiences across the fields of bioengineering and biotechnology, and electrical and chemical engineering. . Authoritative reporting on the latest changes in

microfluidic science, where microscopic liquid volumes are handled as ""microdrops"" and separately from ""nanodrops."" . A methodical examination of how liquid microdrops behave in the complex geometries of modern miniaturized systems and interact with different morphological (micro-fabricated, textured) solid substrates. . A thorough explanation of how capillary forces act on liquid interfaces in contact with micro-fabricated surfaces. . Analysis of how droplets can be manipulated, handled, or transported using electric fields (electrowetting), acoustic actuation (surface acoustic waves), or by a carrier liquid (microflow). . A fresh perspective on the future of microfluidics. The dielectric microstructures act as ultrahigh Q factors optical cavities, which modify the spontaneous emission rates and alter the spatial distributions of the input and output radiation. The editors have selected leading scientists who have made seminal contributions in different aspects of optical processes in microcavities. Every attempt has been made to unify the underlying physics pertaining to microcavities of various shapes. This book begins with a chapter on the role of microcavity modes with additional chapters on how these microcavity modes affect the spontaneous and stimulated emission rates, enhance nonlinear optical processes, used in cavity-QED and chemical physics experiments, aid in single-molecule detection, influence the design of microdisk semiconductor lasers, and how deformed cavities can be treated with classical chaos theory. Immobilizing particles or droplets on electrodes is a novel and most powerful technique for studying the electrochemical reactions of three-phase systems. It gives access to a wealth of information, ranging from quantitative and phase analysis to thermodynamic and kinetic data of electrode processes. Three-phase electrodes with immobilized droplets provide information on the electrochemistry of redox liquids and of compounds dissolved in inert organic liquids. Such measurements allow the determination of the Gibbs energies of the transfer of cations and anions between immiscible solvents, and thus make it possible to assess the hydrophobicity of ions – a property that is of great importance for pharmaceutical applications, biological studies, and for many fields of chemistry. The monograph gives, for the first time, a comprehensive overview of the results published in more than 300 papers over the last 15 years. The experiments are explained in detail, applications from many different fields are presented,

and the theoretical basis of the systems is outlined. Open microfluidics or open-surface is becoming fundamental in scientific domains such as biotechnology, biology and space. First, such systems and devices based on open microfluidics make use of capillary forces to move fluids, without any need for external energy. Second, the "openness" of the flow facilitates the accessibility to the liquid in biotechnology and biology, and reduces the weight in space applications. This book has been conceived to give the reader the fundamental basis of open microfluidics. It covers successively The theory of spontaneous capillary flow, with the general conditions for spontaneous capillary flow, and the dynamic aspects of such flows. The formation of capillary filaments which are associated to small contact angles and sharp grooves. The study of capillary flow in open rectangular, pseudo-rectangular and trapezoidal open microchannels. The dynamics of open capillary flows in grooves with a focus on capillary resistors. The case of very viscous liquids is analyzed. An analysis of suspended capillary flows: such flows move in suspended channels devoid of top cover and bottom plate. Their accessibility is reinforced, and such systems are becoming fundamental in biology. An analysis of "rails" microfluidics, which are flows that move in channels devoid of side walls. This geometry has the advantage to be compatible with capillary networks, which are now of great interest in biotechnology, for molecular detection for example. Paper-based microfluidics where liquids wick flat paper matrix. Applications concern bioassays such as point of care devices (POC). Thread-based microfluidics is a new domain of investigation. It is seeing presently many new developments in the domain of separation and filtration, and opens the way to smart bandages and tissue engineering. The book is intended to cover the theoretical aspects of open microfluidics, experimental approaches, and examples of application.