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Spectral Tuning of Liquid Microdroplets: A Thesis ...

The whispering gallery modes (WGMs) of liquid microdroplets can have high quality factors due to the

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large contact angle. The liquid nature of the microdroplets provides large spectral tuning which can not be obtained by using solid microcavities. The large spectral tuning of WGMs of liquid microdroplets can be obtained by the size change by

SPECTRAL TUNING OF LIQUID MICRODROPLETS STANDING ON A ...

Large spectral tuning of liquid microdroplets by local heating with a focused infrared laser. ... while for the case of glycerol/water microdroplets the spectral tuning mechanism can be made highly reversible when the chamber is saturated with glycerol vapor and the relative water humidity approaches unity.

Large spectral tuning of liquid microdroplets by local ...

increase in the equatorial radius of the microdroplets result-ing in the redshift of the WGMs which circulate in the equa-torial plane parallel to the surface. We demonstrate spectral tuning by up to 4.7 nm as a result of a maximum applied voltage of 400 V. We also show that the observed spectral tuning mechanism is reversible.

Spectral tuning of liquid microdroplets standing on a ...

We report tunability over large spectral ranges up to 30 run at around 590 nm. For salty water microdroplets the reported spectral timing mechanism is almost fully reversible, while for tire case of glycerol/water microdroplets the spectral timing mechanism can be made highly reversible when the chamber is saturated with glycerol vapor and the relative water humidity approaches unity

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For salty water microdroplets the reported spectral tuning mechanism is almost fully reversible, while for the case of glycerol/water microdroplets the spectral tuning mechanism can be made highly reversible when the chamber is saturated with glycerol vapor and the relative water humidity approaches unity.

Large spectral tuning of liquid microdroplets by local ...

These findings indicate laser induced evaporation of the microdroplet as the source of the spectral tuning mechanism. Constant infrared laser illumination leads to the evaporation of the water content of individual microdroplets until a new equilibrium is established with the sealed chamber.

Erratum: “Large spectral tuning of liquid microdroplets by ...

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Using electrowetting, we demonstrate reversible spectral tuning of the whispering gallery modes of glycerol/water microdroplets standing on a superhydrophobic surface by up to 4.7 nm at 400 V. Our results can inspire electrically tunable optical

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Spectral Tuning of Liquid Microdroplets: Karadag, Yasin ...

Spectral Tuning of Liquid Microdroplets, 978-3-8454-3748-4, 9783845437484, 3845437480, Physics, astronomy , Liquid microdroplets standing on a superhydrophobic surface can also provide a three dimensional confinement for light. The use of superhydrophobic surfaces is very efficient and costless way to protect the sphericity and provide the position stabilization of liquid microdroplets.

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Liquid microdroplets standing on a superhydrophobic surface can also provide a three dimensional

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Doctorate of Philosophy in Physics. The use of superhydrophobic surfaces is a very efficient and costless way to protect the sphericity and provide the position stabilization of liquid microdroplets. The whispering gallery modes (WGMs) of liquid microdroplets can have high quality factors due to the large contact ...

Spectral Tuning of Liquid Microdroplets - Yasin Karadag ...

The liquid nature of the microdroplets provides large spectral tuning which can not be obtained by using solid microcavities. The large spectral tuning of WGMs of liquid microdroplets can be obtained by the size change by using evaporation/condensation kinetics or the shape deformation by using electrowetting.

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Liquid microdroplets standing on a superhydrophobic surface can also provide a three dimensional confinement for light. The use of superhydrophobic surfaces is very efficient and costless way to protect the sphericity and provide the position stabilization of liquid microdroplets. The whispering gallery modes (WGMs) of liquid microdroplets can have high quality factors due to the large contact angle. The liquid nature of the microdroplets provides large spectral tuning which can not be obtained by using solid microcavities. The large spectral tuning of WGMs of liquid microdroplets can be obtained by the size change by using evaporation/condensation kinetics or the shape deformation by using electrowetting. In this thesis, first we demonstrate the large spectral tuning of a water-glycerol microdroplet standing on a superhydrophobic surface by local heating experimentally by optical spectroscopy and computationally using a lumped system formulation of the mass and heat transfer between the microdroplet and the chamber. Second, we demonstrate reversible spectral tuning of the whispering gallery modes of glycerol-water microdroplets using electrowetting.

In my career I've found that "thinking outside the box" works better if I know what's "inside the box." Dave Grusin, composer and jazz musician Different people think in different time frames: scientists think in decades, engineers think in years, and investors think in quarters. Stan Williams, Director of Quantum Science Research, Hewlett Packard Laboratories Everything can be made smaller, never mind physics; Everything can be made more efficient, never mind thermodynamics; Everything

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will be more expensive, never mind common sense. Tomas Hirschfeld, pioneer of industrial spectroscopy Integrated Analytical Systems Series Editor: Dr. Radislav A. Potyrailo, GE Global Research, Niskayuna, NY The book series Integrated Analytical Systems offers the most recent advances in all key aspects of development and applications of modern instrumentation for chemical and biological analysis. The key development aspects include (i) innovations in sample introduction through micro- and nano-fluidic designs, (ii) new types and methods of fabrication of physical transducers and ion detectors, (iii) materials for sensors that became available due to the breakthroughs in biology, combinatorial materials science, and nanotechnology, and (iv) innovative data processing and mining methodologies that provide dramatically reduced rates of false alarms.

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

This book deals with the latest achievements in the field of optical coherent microscopy. While many other books exist on microscopy and imaging, this book provides a unique resource dedicated solely to this subject. Similarly, many books describe applications of holography, interferometry and speckle metrology but do not focus on their use for microscopy. The coherent light microscopy reference provided here does not focus on the experimental mechanics of such techniques but instead is meant to provide a users manual to illustrate the strengths and capabilities of developing techniques. The areas of application of this technique are in biomedicine, medicine, life sciences, nanotechnology and materials

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This book on liquid crystals reports on the new perspectives that have been brought about by the recent expansion of frontiers and overhaul of common beliefs. First, it explores the interaction of light with mesophases, when the light or matter is endowed with topological defects. It goes on to show how electrophoresis, electro-osmosis and the swimming of flagellated bacteria are affected by the anisotropic properties of liquid crystals. It also reports on the recent progress in the understanding of thermomechanical and thermohydrodynamical effects in cholesterics and deformed nematics and refutes the common belief that these effects could explain Lehmann's observations of the rotation of cholesteric droplets subjected to a temperature gradient. It then studies the physics of the dowsler texture, which has remarkable properties. This is of particular interest in regards to nematic monopoles, which can easily be generated, set into motion and collided within it. Finally, this book deals with the spontaneous emergence of chirality in nematics made of achiral molecules, and provides a brief historical context of chirality

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

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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.

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.

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The first volume of this text was published in 1961, only a few months after the invention of the laser. This event triggered a wealth of developments, many of which were reported in the 240 review articles which were published in this series since its inception. The present volume contains seven articles covering a wide range of subjects. The first article presents a review of various optical effects in spherical and circular micro-cavities capable of supporting high-Q resonant modes (commonly referred to as morphology-dependent resonances (MDRs) or whispering gallery modes (WGMs)). The second presents a comprehensive review of the theory and practice of optical disk data storage. Other articles include discussions on delay control systems for wideband phased array antennas, and quantum statistical properties of optical beams interacting in nonlinear couplers.

The chemistry, physics, and applications of liquid crystals beyond LCDs Liquid Crystals (LCs) combine order and mobility on a molecular and supramolecular level. But while these remarkable states of matter are most commonly associated with visual display technologies, they have important applications for a variety of other fields as well. *Liquid Crystals Beyond Displays: Chemistry, Physics, and Applications* considers these, bringing together cutting-edge research from some of the most promising areas of LC science. Featuring contributions from respected researchers from around the globe, this edited volume emphasizes the chemistry, physics, and applications of LCs in areas such as photovoltaics, light-emitting diodes, field-effect transistors, lasers, molecular motors, nanophotonics and biosensors. Specific chapters look at magnetic LCs, lyotropic chromonic LCs, LC-based chemical sensors, LCs in metamaterials, and much more. Introducing readers to the fundamentals of LC science through the use of illustrative examples, *Liquid Crystals Beyond Displays* covers not only the most recent research in

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the myriad areas in which LCs are being utilized, but also looks ahead, addressing potential future developments. Designed for physicists, chemists, engineers, and biologists working in academia or industry, as well as graduate students specializing in LC technology, this is the first book to consider LC applications across a wide range of fields.

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