Semiconductor Quantum Dots Vol 571

#quantum dots #semiconductor nanoparticles #nanotechnology research #optoelectronic devices #quantum confinement

Dive deep into the cutting-edge realm of Semiconductor Quantum Dots Vol 571, a comprehensive resource exploring the latest advancements in nanotechnology research. This volume meticulously details the unique properties of semiconductor nanoparticles, delving into principles like quantum confinement and their transformative impact on optoelectronic devices. Discover essential insights for researchers and professionals in materials science and quantum physics.

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Semiconductor Quantum Dots:

There has been witness to remarkable progress in the ability to (a) grow well-controlled dots; (b) characterize dots on a near-atomic level; and (c) theoretically describe their electronic properties using not only continuum, but also atomistic approaches. This book focuses on the broad scientific and technological interest in semiconductor quantum dots. Papers on growth and self-assembly/self-organization, as well as characterization of semiconductor quantum dots based upon various materials systems, e.g., silicon-germanium, III-V materials, and II-VI materials, are included. Discussions of technological applications, ranging from biomedical technology, microelectronics and photonics, to more esoteric applications including quantum computing, are also featured. Topics include: Si and Ge dots; II-VI and other free-standing (colloidal) dots; near-field spectroscopy of quantum dots, wires and metals; organized dots and dot arrays; transport, coulomb blockade and metallic dots; optical spectroscopy and phonons; light-emitting quantum dots; and structural characterization and growth.

Semiconductor Quantum Dots

Semiconductor Quantum Dots presents an overview of the background and recent developments in the rapidly growing field of ultrasmall semiconductor microcrystallites, in which the carrier confinement is sufficiently strong to allow only quantized states of the electrons and holes. The main emphasis of this book is the theoretical analysis of the confinement induced modifications of the optical and electronic properties of quantum dots in comparison with extended materials. The book develops the theoretical background material for the analysis of carrier quantum-confinement effects, introduces the different confinement regimes for relative or center-of-mass motion quantization of the electron-hole-pairs, and gives an overview of the best approximation schemes for each regime. A detailed discussion of the carrier states in quantum dots is presented and surface polarization instabilities are analyzed, leading to the self-trapping of carriers near the surface of the dots. The influence of spin-orbit coupling on the

quantum-confined carrier states is discussed. The linear and nonlinear optical properties of small and large quantum dots are studied in detail and the influence of the quantum-dot size distribution in many realistic samples is outlined. Phonons in quantum dots as well as the influence of external electric or magnetic fields are also discussed. Last but not least the recent developments dealing with regular systems of quantum dots are also reviewed. All things included, this is an important piece of work on semiconductor quantum dots not to be dismissed by serious researchers and physicists.

Semiconductor Quantum Dots

Semiconductor quantum dots represent one of the fields of solid state physics that have experienced the greatest progress in the last decade. Recent years have witnessed the discovery of many striking new aspects of the optical response and electronic transport phenomena. This book surveys this progress in the physics, optical spectroscopy and application-oriented research of semiconductor quantum dots. It focuses especially on excitons, multi-excitons, their dynamical relaxation behaviour and their interactions with the surroundings of a semiconductor quantum dot. Recent developments in fabrication techniques are reviewed and potential applications discussed. This book will serve not only as an introductory textbook for graduate students but also as a concise guide for active researchers.

Single Semiconductor Quantum Dots

This book reviews recent advances in the field of semiconductor quantum dots via contributions from prominent researchers in the scientific community. Special focus is given to optical, quantum optical, and spin properties of single quantum dots.

Semiconductor Quantum Dots II: Volume 642

The MRS Symposium Proceeding series is an internationally recognised reference suitable for researchers and practitioners.

Capture and Relaxation in Self-Assembled Semiconductor Quantum Dots

This is an overview of different models and mechanisms developed to describe the capture and relaxation of carriers in quantum-dot systems. Despite their undisputed importance, the mechanisms leading to population and energy exchanges between a quantum dot and its environment are not yet fully understood. The authors develop a first-order approach to such effects, using elementary quantum mechanics and an introduction to the physics of semiconductors. The book results from a series of lectures given by the authors at the Master's level.

Quantum Dots

Quantum dots (QDs) are luminescent semiconductor nanocrystals with unique chemical and physical properties due to their size and highly compact structure. QDs were first proposed for use in luminescent concentrators to replace organic dye molecules. In this book, the interest is in taking advantage of the emission properties of QDS, which can be tuned by their size, resulting from quantum confinement. In addition, the book discusses the potential of QDs as contrast and therapeutic agents in the field of medicine.

Self-Assembled InGaAs/GaAs Quantum Dots

This volume is concerned with the crystal growth, optical properties, and optical device application of the self-formed quantum dot, which is one of the major current subjects in the semiconductor research field. The atom-like density of states in quantum dots is expected to drastically improve semiconductor laser performance, and to develop new optical devices. However, since the first theoretical prediction for its great possibilities was presented in 1982, due to the difficulty of their fabrication process. Recently, the advent of self-organized quantum dots has made it possible to apply the results in important optical devices, and further progress is expected in the near future. The authors, working for Fujitsu Laboratories, are leading this quantum-dot research field. In this volume, they describe the state of the art in the entire field, with particular emphasis on practical applications.

Quantum Dots

In this book, leading experts on quantum dot theory and technology provide comprehensive reviews of all aspects of quantum dot systems. The following topics are covered: (1) energy states in quantum dots, including the effects of strain and many-body effects; (2) self-assembly and self-ordering of quantum dots in semiconductor systems; (3) growth, structures, and optical properties of III-nitride quantum dots; (4) quantum dot lasers.

Single Quantum Dots

Special focus is given to the optical and electronic properties of single quantum dots due to their potential applications in devices operating with single electrons and/or single photons. This includes quantum dots in electric and magnetic fields, cavity-quantum electrodynamics, nonclassical light generation, and coherent optical control of excitons.

Semiconductor Photochemistry And Photophysics/Volume Ten

Key topics in this publication include semiconductor photochemistry and photoelectrochemistry, dye-sensitized solar cells and photocatalytic treatment of chemical waste. It discusses the commercialization and solar energy conversion of DSSC and the photocatalytic oxidation of air contaminants.

Quantum Dots

We present an overview of the theoretical background and experimental re sults in the rapidly developing field of semiconductor quantum dots - systems 8 6 of dimensions as small as 10- -10- m (quasi-zero-dimensional) that contain a small and controllable number (1-1000) of electrons. The electronic structure of quantum dots, including the energy quan tization of the single-particle states (due to spatial confinement) and the evolution of these (Fock-Darwin) states in an increasing external magnetic field, is described. The properties of many-electron systems confined in a dot are also studied. This includes the separation of the center-of-mass mo tion for the parabolic confining potential (and hence the insensitivity of the transitions under far infrared radiation to the Coulomb interactions and the number of particles - the generalized Kohn theorem) and the effects due to Coulomb interactions (formation of the incompressible magic states at high magnetic fields and their relation to composite jermions), and finally the spin-orbit interactions. In addition, the excitonic properties of quantum dots are discussed, including the energy levels and the spectral function of a single exciton, the relaxation of confined carriers, the metastable states and their effect on the photoluminescence spectrum, the interaction of an exciton with carriers, and exciton condensation. The theoretical part of this work, which is based largely on original re sults obtained by the authors, has been supplemented with descriptions of various methods of creating quantum-dot structures.

Quantum Dot Heterostructures

Da die Nachfrage nach immer schnelleren und kleineren Halbleiterbauelementen stetig wächst, sind Quanten-Dots und -Pyramiden rasant in den Mittelpunkt der Halbleiterforschung gerückt. Dieses Buch vermittelt einen umfassenden Überblick über den aktuellen Forschungsstand auf diesem Gebiet. Behandelt werden u.a. Fragen, wie Strukturen aufgebaut, wie sie charakterisiert werden und wie sie die Leistungsfähigkeit der Bauelemente bestimmen. (11/98)

Semiconductor Quantum Bits

This book highlights state-of-the-art qubit implementations in semiconductors and provides an extensive overview of this newly emerging field. Semiconductor nanostructures have huge potential as future quantum information devices as they provide various ways of qubit implementation (electron spin, electronic excitation) as well as a way to transfer quantum information from stationary qubits to flying qubits (photons). Therefore, this book unites contributions from leading experts in the field, reporting cutting-edge results on spin qubit preparation, read-out and transfer. The latest theoretical as well as experimental studies of decoherence in these quantum information systems are also provided. Novel demonstrations of complex flying qubit states and first applications of semiconductor-based quantum information devices are given, too.

Semiconductor Quantum Dots

Quantum dots are nano-sized particles of semiconducting material, typically chalcogenides or phosphides of metals found across groups II to VI of the periodic table. Their small size causes them to

exhibit unique optical and electrical properties which are now finding applications in electronics, optics and in the biological sciences. Synthesis of these materials began in the late 1980's and this book gives a thorough background to the topic, referencing these early discoveries. Any rapidly-expanding field will contain vast amounts of publications, and this book presents a complete overview of the field, bringing together the most relevant and seminal aspects literature in an informed and succinct manner. The author has been an active participant in the field since its infancy in the mid 1990's, and presents a unique handbook to the synthesis and application of this unique class of materials. Drawing on both his own experience and referencing the primary literature, Mark Green has prepared. Postgraduates and experienced researchers will benefit from the comprehensive nature of the book, as will manufacturers of quantum dots and those wishing to apply them.

Quantum Dots

The book "Quantum dots: A variety of a new applications" provides some collections of practical applications of quantum dots. This book is divided into four sections. In section 1 a review of the thermo-optical characterization of CdSe/ZnS core-shell nanocrystal solutions was performed. The Thermal Lens (TL) technique was used, and the thermal self-phase Modulation (TSPM) technique was adopted as the simplest alternative method. Section 2 includes five chapters where novel optical and lasing application are discussed. In section 3 four examples of quantum dot system for different applications in electronics are given. Section 4 provides three examples of using quantum dot system for biological applications. This is a collaborative book sharing and providing fundamental research such as the one conducted in Physics, Chemistry, Biology, Material Science, Medicine with a base text that could serve as a reference in research by presenting up-to-date research work on the field of quantum dot systems.

Capture and Relaxation in Self-Assembled Semiconductor Quantum Dots

This book describes the full range of possible strategies for laterally aligning self-assembled quantum dots on a substrate surface, beginning with pure self-ordering mechanisms and culminating with forced alignment by lithographic positioning. The text addresses both short- and long-range ordering phenomena and introduces future high integration of single quantum dot devices on a single chip. Contributions by well-known experts ensure that all relevant quantum-dot heterostructures are elucidated from diverse perspectives.

Lateral Alignment of Epitaxial Quantum Dots

Filling a gap in the literature, this up-to-date introduction to the field provides an overview of current experimental techniques, basic theoretical concepts, and sample fabrication methods. Following an introduction, this monograph deals with optically active quantum dots and their integration into electro-optical devices, before looking at the theory of quantum confined states and quantum dots interacting with the radiation field. Final chapters cover spin-spin interaction in quantum dots as well as spin and charge states, showing how to use single spins for break-through quantum computation. A conclusion and outlook round off the volume. The result is a primer providing the essential basic knowledge necessary for young researchers entering the field, as well as semiconductor and theoretical physicists, PhD students in physics and material sciences, electrical engineers and materials scientists.

Spins in Optically Active Quantum Dots

A comprehensive review of cutting-edge solid state research, focusing on quantum dot nanostructures, for graduate students and researchers.

Quantum Dots

In the last two decades, semiconductor quantum dots—small colloidal nanoparticles—have garnered a great deal of scientific interest because of their unique properties. Among nanomaterials, CdTe holds special technological importance as the only known II–VI material that can form conventional p–n junctions. This makes CdTe very important for the development of novel optoelectronic devices such as light-emitting diodes, solar cells, and lasers. Moreover, the demand for water-compatible light emitters and the most common biological buffers give CdTe quantum dots fields a veritable edge in biolabeling and bioimaging. Cadmium Telluride Quantum Dots: Advances and Applications focuses on CdTe quantum dots and addresses their synthesis, assembly, optical properties, and applications in

biology and medicine. It makes for a very informative reading for anyone involved in nanotechnology and will also benefit those scientists who are looking for a comprehensive account on the current state of quantum dot–related research.

Cadmium Telluride Quantum Dots

Modern Semiconductor Quantum Physics has the following constituents: (1) energy band theory: pseudopotential method (empirical and ab initio); density functional theory; quasi-particles; LCAO method; k.p method; spin-orbit splitting; effect mass and Luttinger parameters; strain effects and deformation potentials; temperature effects. (2) Optical properties: absorption and exciton effect; modulation spectroscopy; photo luminescence and photo luminescence excitation; Raman scattering and polaritons; photoionization. (3) Defects and Impurities: effective mass theory and shallow impurity states; deep state cluster method, super cell method, Green's function method; carrier recombination kinetics; trapping transient measurements; electron spin resonance; electron lattice interaction and lattice relaxation effects; multi-phonon nonradiative recombination; negative U center, DX center and EL2 Defects. (4) Semiconductor surfaces: two dimensional periodicity and surface reconstruction; surface electronic states; photo-electron spectroscopy; LEED, STM and other experimental methods. (5) Low-dimensional structures: Heterojunctions, quantum wells; superlattices, quantum-confined Stark effect and Wannier-Stark ladder effects; resonant tunneling, quantum Hall effect, quantum wires and quantum dots.This book can be used as an advanced textbook on semiconductor physics for graduate students in physics and electrical engineering departments. It is also useful as a research reference for solid state scientists and semiconductor device engineers.

Modern Semiconductor Quantum Physics

Quantum Wells, Wires and Dots, 3rd Edition is aimed at providing all the essential information, both theoretical and computational, in order that the reader can, starting from essentially nothing, understand how the electronic, optical and transport properties of semiconductor heterostructures are calculated. Completely revised and updated, this text is designed to lead the reader through a series of simple theoretical and computational implementations, and slowly build from solid foundations, to a level where the reader can begin to initiate theoretical investigations or explanations of their own.

Quantum Wells, Wires and Dots

Written by international experts, Physics and Applications of Semiconductor Quantum Structures covers the most important recent advances in the field. Beginning with a review of the evolution of semiconductor superlattices and quantum nanostructures, the book explores fabrication and characterization techniques, transport, optical, and spin-depende

Physics and Applications of Semiconductor Quantum Structures

stacked QD structure and is useful for examining the possibility of all optical measurement of stacked QD layers. Optical absorption spectra of self-assembled QDs has been little reported, and further investigation in necessary to study hole-burning memory. 2.5 Summary This chapter describes recent advances in quantum dot fabrication tech nologies, focusing on our self-formed quantum dot technologies including TSR quantum dots and SK-mode self-assembled quantum dots. As is described in this chapter, there are many possible device applications such as quantum dot tunneling memory devices, quantum dot fioating-dot gate FETs, quantum dot lasers, and quantum dot hole-burning memory devices. The quantum dot laser applications seem to be the most practicable among these applications. However, many problems remain to be solved before even this application becomes practical. The most important issue is to of self-assembled quantum dots more pre control the size and position cisely, with an accuracy on an atomic scale. The confinement must be enough to keep the separation energy between quantized energy levels high enough to get high-temperature characteristics. The lasing oscillation frequency should be fixed at 1.3 f.lITl or 1.5 f.lITl for optical communication. Phonon bottleneck problems should be solved by the optimization of device structures. Fortunately, there is much activity in the area of quantum dot lasers and, therefore, many breakthroughs will be made, along with the exploration of other new application areas.

Quantum Semiconductor Devices and Technologies

Colloidal Quantum Dot Light Emitting Diodes Explore all the core components for the commercialization of quantum dot light emitting diodes Quantum dot light emitting diodes (QDLEDs) are a technology with the potential to revolutionize solid-state lighting and displays. Due to the many applications of semiconductor nanocrystals, of which QDLEDs are an example, they also hold the potential to be adapted into other emerging semiconducting technologies. As a result, it is critical that the next generation of engineers and materials scientists understand these diodes and their latest developments. Colloidal Quantum Dot Light Emitting Diodes: Materials and Devices offers a comprehensive introduction to this subject and its most recent research advancements. Beginning with a summary of the theoretical foundations and the basic methods for chemically synthesizing colloidal semiconductor quantum dots, it identifies existing and future applications for these groundbreaking technologies. The result is tailored to produce a thorough understanding of this area of research. Colloidal Quantum Dot Light Emitting Diodes readers will also find: An author with decades of experience in the field of organic electronics Detailed discussion of topics including advanced display technologies, the patent portfolio and commercial considerations, and more Strategies and design techniques for improving device performance Colloidal Quantum Dot Light Emitting Diodes is ideal for material scientists, electronics engineers, inorganic and solid-state chemists, solid-state and semiconductor physicists, photochemists, and surface chemists, as well as the libraries that support these professionals.

Theory of Semiconductor Quantum Dots

This book discusses the basic physics of semiconductor macroatoms at the nanoscale as well as their potential application as building blocks for the realization of new-generation quantum devices.It provides a review on state-of-the art fabrication and characterization of semiconductor quantum dots aimed at implementing single-electron/exciton devices for quantum information processing and communication. After an introductory chapter on the fundamentals of quantum dots, a number of more specialized review articles presents a comprehensive picture of this rapidly developing field, specifically including strongly multidisciplinary topics such as state-of-the-art nanofabrication and optical characterization, fully microscopic theoretical modeling of nontrivial many-body processes, as well as design and optimization of novel quantum-device architectures.Sample Chapter(s)

Colloidal Quantum Dot Light Emitting Diodes

This multidisciplinary book provides up-to-date coverage of carrier and spin dynamics and energy transfer and structural interaction among nanostructures. Coverage also includes current device applications such as quantum dot lasers and detectors, as well as future applications to quantum information processing. The book will serve as a reference for anyone working with or planning to work with quantum dots.

Semiconductor Macroatoms

This book discusses the basic physics of semiconductor macroatoms at the nanoscale as well as their potential application as building blocks for the realization of new-generation quantum devices. It provides a review on state-of-the art fabrication and characterization of semiconductor quantum dots aimed at implementing single-electron/exciton devices for quantum information processing and communication. After an introductory chapter on the fundamentals of quantum dots, a number of more specialized review articles presents a comprehensive picture of this rapidly developing field, specifically including strongly multidisciplinary topics such as state-of-the-art nanofabrication and optical characterization, fully microscopic theoretical modeling of nontrivial many-body processes, as well as design and optimization of novel quantum-device architectures. Contents: Fundamentals of Zero-Dimensional NanostructuresGrowth and Characterization of Self-Assembled Semiconductor MacroatomsUltrafast Coherent Spectroscopy of Single Semiconductor Quantum DotsFew-Particle Effects in Semiconductor Macroatoms/MoleculesElectron-Phonon Interaction in Semiconductor Quantum DotsPhonon-Induced Decoherence in Semiconductor Quantum DotsAll-Optical Schemes for Quantum Information Processing with Semiconductor MacroatomsNovel Devices for the Measurement of Electronic States in Semiconductor Quantum Dots Readership: Graduate students and academics in condensed matter physics, semiconductors and related area, and electron state in nanoscale systems. Key Features:Unique combination of introductory/review material on quantum-dot physics and most advanced research results in this rapidly developing fieldStrong and continuous link between nanodevice fabrication/characterization and theoretical modeling/simulationCohesive and selfcontained treatment of diverse issues related to semiconductor-device physics and nanotechnologyMost of the

scientific activity presented in the book is the result of a number of cross-collaborations within a large-scale European Project, thus the volume offers a cohesive perspective on the many research areas involvedKeywords:Semiconductor Macroatoms;Quantum Dots;Quantum Devices;Quantum Information;Quantum Computation;Few-Electron Systems;Nanofabrication;Ultrafast Spectroscopy

Self-Assembled Quantum Dots

This volume is concerned with the crystal growth, optical properties, and optical device application of the self-formed quantum dot, which is one of the major current subjects in the semiconductor research field. The atom-like density of states in quantum dots is expected to drastically improve semiconductor laser performance, and to develop new optical devices. However, since the first theoretical prediction for its great possibilities was presented in 1982, due to the difficulty of their fabrication process. Recently, the advent of self-organized quantum dots has made it possible to apply the results in important optical devices, and further progress is expected in the near future. The authors, working for Fujitsu Laboratories, are leading this quantum-dot research field. In this volume, they describe the state of the art in the entire field, with particular emphasis on practical applications.

Semiconductor Macroatoms

Semiconductor quantum dots, also known as nanocrystals, are structures with electronic and optical properties that can be engineered through the size of the structure, not just the composition. Quantum confinement of charge carriers leads to a wide range of intriguing physical and chemical phenomena, and is a new degree of freedom in material design. Semiconductor quantum dots have potential for applications ranging from optoelectronic devices to biological imaging. The papers selected for this volume treat the fundamental properties of semiconductor quantum dots and form a significant part of the foundation on which the current field of nanoscience research is built.

Self-Assembled InGaAs/GaAs Quantum Dots

Semiconductor quantum science and technology is exploring the exciting and emerging prospects of integrating quantum functionality on semiconductor platforms to convert current information technology into quantum information technology. The past twenty years have led to incredible advances in this field. This book brings together the leading scientists who present the main achievements and challenges by reviewing and motivating the state-of-the-art at a tutorial level. The key challenges include creating quantum-light sources, quantum information processing via strong light-matter interaction, discovering new quantum materials as well as quasiparticles, and determining new quantum spectroscopic methodologies for superior control of quantum phenomena. As an important step, integration of these solutions on a semiconductor chip is discussed, and outlook for the future of semiconductor quantum science and technology is given. Leading experts present their vision on semiconductor quantum science and technology All aspects needed to realize semiconductor quantum science and technology are explained Quantum semiconductors from overviewed a tutorial introduction to the state-of-the-art

Selected Papers on Semiconductor Quantum Dots

Semiconductor Quantum Well Intermixing is an international collection of research results dealing with several aspects of the diffused quantum well (DFQW), ranging from Physics to materials and device applications. The material covered is the basic interdiffusion mechanisms of both cation and anion groups as well as the properties of band structure modifiations. Its comprehensive coverage of growth and pos-growth processing technologies along with its presentation of the various interesting and advanced features of the DFQW materials make this book an essential reference to the study of QW layer intermixing.

Semiconductor Quantum Science and Technology

Annotation Tiny structures measurable on the nanometer scale (one-billionth of a meter) are known as nanostructures, and nanotechnology is the emerging application of these nanostructures into useful nanoscale devices. As we enter the 21st century, more and more professional are using nanotechnology to create semiconductors for a variety of applications, including communications, information technology, medical, and transportation devices. Written by today's best researchers of semiconductor nanostructures, this cutting-edge resource provides a snapshot of this exciting and fast-changing

field. The book covers the latest advances in nanotechnology and discusses the applications of nanostructures to optoelectronics, photonics, and electronics.

Semiconductor Quantum Well Intermixing

This book looks at the effects of ion implantation as an effective post-growth technique to improve the material properties, and ultimately, the device performance of In(Ga)As/GaAs quantum dot (QD) heterostructures. Over the past two decades, In(Ga)As/GaAs-based QD heterostructures have marked their superiority, particularly for application in lasers and photodetectors. Several in-situ and ex-situ techniques that improve material quality and device performance have already been reported. These techniques are necessary to maintain dot density and dot size uniformity in QD heterostructures and also to improve the material quality of heterostructures by removing defects from the system. While rapid thermal annealing, pulsed laser annealing and the hydrogen passivation technique have been popular as post-growth methods, ion implantation had not been explored largely as a post-growth method for improving the material properties of In(Ga)As/GaAs QD heterostructures. This work attempts to remedy this gap in the literature. The work also looks at introduction of a capping layer of quaternary alloy InAlGaAs over these In(Ga)As/GaAs QDs to achieve better QD characteristics. The contents of this volume will prove useful to researchers and professionals involved in the study of QDs and QD-based devices.

Semiconductor Nanostructures for Optoelectronic Applications

Captures the most up-to-date research in the field, written in an accessible style by the world's leading experts.

Impact of Ion Implantation on Quantum Dot Heterostructures and Devices

The book provides a thorough survey of current research in quantum dots synthesis, properties, and applications. The unique properties of these new nanomaterials offer multifunctional applications in such fields as photovoltaics, light-emitting diodes, field-effect transistors, lasers, photodetectors, solar cells, biomedical diagnostics and quantum computing. Keywords: Quantum Dots (QD), Photovoltaics, Light-emitting Diodes, Field-effect Transistors, Lasers, Photodetectors, Solar Cells, Biomedical Diagnostics, Quantum Computing, QD Synthesis, Carbon QDs, Graphene QDs, QD Sensors, Supercapacitors, Magnetic Quantum Dots, Cellular/Molecular Separation, Chromatographic Separation Column, Photostability, Luminescence of Carbon QDs, QD Materials for Water Treatment, Semiconductor Quantum Dots, QD Drug Delivery, Antibacterial Quantum Dots.

Colloidal Quantum Dot Optoelectronics and Photovoltaics

Quantum technology is the key to next-generation optoelectronics and laser semiconductors, and this new cutting-edge book is an in-depth examination of how quantum dots and wires are fabricated and applied to optics. You find a solid tutorial on the optical properties of nanoscale dots and wires that explains the current state of this technology and why it is so promising. The book presents a detailed survey of techniques based on molecular beam epitaxial growth for fabricating semiconductor quantum dots and wires. You learn how to assess these growth strategies for insertion of dots and wires into devices.

Quantum Dots

Special focus is given to the optical and electronic properties of single quantum dots due to their potential applications in devices operating with single electrons and/or single photons. This includes quantum dots in electric and magnetic fields, cavity-quantum electrodynamics, nonclassical light generation, and coherent optical control of excitons.

Optics of Quantum Dots and Wires

Single Quantum Dots