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Semiconductor Nanostructures For Optoelectronic Applications Artech House Semiconductor Materials And Devices Library

Semiconductor nanostructures for optoelectronics applications Semiconductor Nanostructures for Optoelectronic Applications by Prof Chennupati Jagadish Semiconductor Nanostructures for Optoelectronics Applications Semiconductor Nanostructures for Optoelectronics Applications - Prof Chennupati Jagadish Chennupati Jagadish: \"Semiconductor Nanostructures for Optoelectronics Applications\" Science Talks Lecture 71: Semiconductor Nanosctructures for Optoelectronics Applications Chennupati Jagadish presents Semiconductor Nanostructures for Optoelectronics Applications at IWAM UDL 14 , Semiconductor Nanostructures for Optoelectronics Applications Semiconductor Nanostructures for Optoelectronics and Energy Applications Books to Learn Electronics #491 Recommended Electronics Books Three basic electronics books reviewed Future of Nanotechnology - Pioneering Innovations at the Nanoscale | Tech Scientist Nanotechnology: Nanoelectronics EEVblog #1270 - Electronics Textbook Shootout 0D Vs 1D Vs 2D Vs 3D | Nanomaterials Classification 5 Books on learning electronics practically !! Quantum Transport, Lecture 1: Introduction The map of semiconductor materials What does nanooptoelectronics mean? Mark Brongersma: Device Applications of Semiconductor Nanoantennas and Metafilms Bowl a Thon Event by IEEE Photonics CUSB 2D Semiconductor nanostructures at atomic scale Persistent Spin Textures in Semiconductor Nanostructures - John Schliemann Speaker Professor Chennupati Jagdish | IEEE Photonics Society Chandigarh University Student Branch

Semiconductor Nanostructures for Optoelectronic Devices

Semiconductor Nanophotonics

Localization Effects in Disordered III-V Semiconductor Nanostructures

GaN Based Nanostructures for Optoelectronic and Spintronic Applications

Nanoscale Compound Semiconductors and their Optoelectronics Applications

Handbook of Semiconductor Nanostructures and Nanodevices

Characterization of Semiconductor Heterostructures and Nanostructures
Epitaxy of Nanostructures
Semiconductor Nanocrystals and Metal Nanoparticles
Special Issue: EMRS 2007, Symposium B: Semiconductor Nanostructures Towards Electronic and Optoelectronic Device Applications
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Semiconductor Nanostructures Towards Electronic and Optoelectronic Device Applications II (Symposium K, E-MRS 2009 Spring Meeting)
Optical Properties of III-V Semiconductor Nanostructures and Quantum Wells
Theory of Transport Properties of Semiconductor Nanostructures

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GRACE CALLUM

Semiconductor Nanostructures for Optoelectronic Devices SPIE-International Society for Optical Engineering
Offering perspective on both the scientific and engineering aspects of 2D semiconductors, Ultrathin Two-Dimensional Semiconductors for Novel Electronic Applications discusses how to successfully engineer 2D materials for practical applications. It also covers several novel topics regarding 2D semiconductors which have not yet been discussed in any other publications. Features: Provides comprehensive information and data about wafer-scale deposition of 2D semiconductors, ranging from scientific discussions up to the planning of experiments and reliability testing of the fabricated samples Precisely discusses wafer-scale ALD and CVD of 2D semiconductors and investigates various aspects of deposition techniques Covers the new group of 2D materials synthesized from surface oxide of liquid metals and also explains the device fabrication and post-treatment of these 2D nanostructures Addresses a wide range of scientific and practical applications of 2D semiconductors and electronic and optoelectronic devices based on these nanostructures Offers novel coverage of 2D heterostructures and heterointerfaces and provides practical information about fabrication and application of these heterostructures Introduces the latest advancement in fabrication of novel memristors, artificial synapses and sensorimotor devices based on 2D semiconductors This work offers practical information valuable for engineering applications that will appeal to researchers, academics, and scientists working with and interested in developing an array of semiconductor electronic devices.
Semiconductor Nanophotonics Artech House Publishers

In recent years, with the advent of fine line lithographical methods, molecular beam epitaxy, organometallic vapour phase epitaxy and other experimental techniques, low dimensional structures having quantum confinement in one, two and three dimensions (such as ultrathin films, inversion layers, accumulation layers, quantum well superlattices, quantum well wires, quantum wires superlattices, magneto-size quantizations, and quantum dots) have attracted much attention not only for their potential in uncovering new phenomena in nanoscience and technology, but also for their interesting applications in the areas of quantum effect devices. In ultrathin films, the restriction of the motion of the carriers in the direction normal to the film leads to the quantum size effect and such systems find extensive applications in quantum well lasers, field effect transistors, high speed digital networks and also in other quantum effect devices. In quantum well wires, the carriers are quantized in two transverse directions and only one-dimensional motion of the carriers is allowed.

Localization Effects in Disordered III-V Semiconductor Nanostructures Elsevier

This book, the second of two volumes, describes heterostructures and optoelectronic devices made from GaN and ZnO nanowires. Over the last decade, the number of publications on GaN and ZnO nanowires has grown exponentially, in particular for their potential optical applications in LEDs, lasers, UV detectors or solar cells. So far, such applications are still in their infancy, which we analyze as being mostly due to a lack of understanding and control of the growth of nanowires and related heterostructures. Furthermore, dealing with two different but related semiconductors such as ZnO and GaN, but also with different chemical and physical synthesis methods, will bring valuable comparisons in order to gain a general approach for the growth of wide band gap nanowires applied to optical devices

GaN Based Nanostructures for Optoelectronic and Spintronic Applications

Cambridge University Press

Semiconductor nanocrystals and metal nanoparticles are the building blocks of the next generation of electronic, optoelectronic, and photonic devices. Covering this rapidly developing and interdisciplinary field, the book examines in detail the physical properties and device applications of semiconductor nanocrystals and metal nanoparticles. It begins with a review of the synthesis and characterization of various semiconductor nanocrystals and metal nanoparticles and goes on to discuss in detail their optical, light emission, and electrical properties. It then illustrates some exciting applications of nanoelectronic devices (memristors and single-electron devices) and optoelectronic devices (UV detectors, quantum dot lasers, and solar cells), as well as other applications (gas sensors and metallic nanopastes for power electronics packaging). Focuses on a new class of materials that exhibit fascinating physical properties and have many exciting device applications. Presents an overview of synthesis strategies and characterization techniques for various semiconductor nanocrystal and metal nanoparticles. Examines in detail the optical/optoelectronic properties, light emission properties, and electrical properties of semiconductor nanocrystals and metal nanoparticles. Reviews

applications in nanoelectronic devices, optoelectronic devices, and photonic devices.

Springer Science & Business Media
The main focus of the book are the physical mechanisms behind the spontaneous formation of ordered nanostructures at semiconductor surfaces. These mechanisms are at the root of recent breakthroughs in advanced nanotechnology of quantum-wire and quantum-dot fabrication. Generic theoretical models are presented addressing formation of all basic types of nanostructures, including periodically faceted surfaces, arrays of step-bunches of equal heights and single- and multi-sheet arrays of both 2- and 3-D strained islands. Decisive experiments on both structural and optical characterization of nanostructures are discussed to verify theoretical models and link them to practical examples.

Nanoscale Compound Semiconductors and their Optoelectronics Applications CRC Press
Tremendous progress has been made in the last few years in the growth, doping and processing technologies of the wide bandgap semiconductors. As a result, this class of materials now holds significant promis for semiconductor electronics in a broad range of applications. The principal driver for the current revival of interest in III-V Nitrides is their potential use in high power, high temperature, high frequency and optical devices resistant to radiation damage. This book provides a wide number of optoelectronic applications of III-V nitrides and covers the entire process from growth to devices and applications making it essential reading for those working in the semiconductors or microelectronics. Broad review of optoelectronic applications of III-V nitrides

Handbook of Semiconductor Nanostructures and Nanodevices Springer Science & Business Media
We have investigated the optoelectronic applications of interband and intersubband transitions in III-V semiconductors quantum wells and quantum dots. The research efforts included the investigation of intersubband transitions in GaN/AlGaN multiple quantum wells for the 1.3 and 1.5 micron spectral ranges. These wavelengths are important for optical communications. Furthermore, we investigated single wall carbon nanotubes for possible use as space-based solar cell. The final report contains detail discussions of the results obtained during the last three years. At the end of the report, we listed our professional activities including technical papers, books, symposia, invited talks, and students supported by the grant.

Characterization of Semiconductor Heterostructures and Nanostructures John Wiley & Sons
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. You learn how to grow, characterize and design optoelectronic devices using semiconductor nanostrucutres, and how to incorporate semiconductor nanostructures materials into conventional quantum well devices. Moreover, the book reviews optical, electronic, and structural characterization techniques to help you determine the properties of nanostructures and explore

novel nanostructured materials.
Epitaxy of Nanostructures CRC Press
Due to the increasing demands industrially as well as scientifically on new optoelectronic devices for specific applications, semiconductor materials with desired energy band-gap are needed. In this context, alloying provides the ability to tailor the energy band gap of a compound semiconductor (ternary or quaternary) through the manipulation of its constituent composition. In this thesis, It is focused on two different III-V-based compound semiconductor materials, Ga(NAsP) and Ga(AsBi), both are promising for long-wavelength optoelectronic applications. In particular, quaternary Ga(NAsP) semiconductor structures can be utilized for the fabrication of intermediate band solar cells, for infrared laser emission, and, with a tremendous potential, for the realization of monolithic optoelectronic integrated circuits on silicon substrate (silicon photonics). On the other hand, ternary Ga(AsBi) semiconductor structures have been employed for a variety of applications including, for example, but not limited to, photoconductive terahertz antennas, light-emitting diodes (LEDs), and optically pumped as well as electrically injected laser diodes. Band gap engineering is achieved in the studied GaAs-based compounds by varying the amount of the incorporated V-element, i.e., nitrogen or bismuth. Despite the advantage of a shrinking in the band-gap energy, the introduction of a small amount of a V-element to a GaAs host structure results in an increase in the disorder potential due to the differences, e.g., in size and electronegativity between the incorporated and substituted anions. The presence of disorder effects within a semiconductor can significantly influence its electronic structure, i.e., the density of localized states (DOS) is increased. Disorder-induced localized states drastically affect carrier recombination processes in semiconductors. The changes in carrier dynamics can be revealed by investigating, e.g., electrical and optical properties of disordered semiconductors. In the presented work, photoluminescence (PL) spectroscopy measurements are employed for the characterization of disorder in semiconductor nanostructures. Beside the need of a qualitative explanation, a quantitative description of disorder effects, i.e., energy scaling of the disorder potential, is a task of crucial importance. Both aspects are discussed through the thesis.
Semiconductor Nanocrystals and Metal Nanoparticles Artech House
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.

Special Issue: EMRS 2007, Symposium B: Semiconductor Nanostructures Towards Electronic and Optoelectronic Device Applications

Cuvillier Verlag
Nanoscale Compound Semiconductors and their Optoelectronics Applications provides the basic and fundamental properties of nanoscale compound semiconductors and their role in modern technological products. The book discusses all important properties of this important category of materials such as their optical properties, size-dependent properties, and tunable properties. Key methods are reviewed, including synthesis techniques and characterization strategies. The role of compound semiconductors in the advancement of energy efficient optoelectronics and solar cell devices is also discussed. The book also touches on the photocatalytic property of the materials by doping with graphene oxides--an emerging and new pathway. Covers all relevant types of nanoscale compound semiconductors for optoelectronics, including their synthesis, properties and applications Provides historical context and review of emerging trends in semiconductor technology, particularly emphasizing advances in non-toxic semiconductor materials for green technologies Reviews emerging applications of nanoscale compound semiconductor-based devices in optoelectronics, energy and environmental sustainability
Quantum Optics with Semiconductor Nanostructures John Wiley & Sons
Nanomaterials for Sensing and Optoelectronic Applications explores recent trends in nanomaterials and devices for chemical and biosensing applications. The synthesis, properties and applications of metal oxide nanostructures, as well as two-dimensional layered materials are covered, along with the fabrication of optoelectronic devices, such as chemical sensors, biosensors, core-shell nanostructures-based surface-enhanced Raman spectroscopy (SERS) substrates, luminescent nanoparticles, memory devices, and thin film transistors. Aiming at researchers in these respective areas, the fundamental principles and mechanisms of the optoelectronic phenomena behind every application mentioned are covered and comprehensively explored. The book will be helpful in solving problems related to the synthesis and growth of various nanostructures, the application of these materials for various devices, and to understand how a specific synthesis route promotes a specific application. Outlines the fundamental principles and mechanisms behind chemical sensing, bio-sensing, thin film transistor devices, and memory devices Offers a detailed description on the synthesis of 2D materials and oxide nanostructures, with thin films included Assesses the major properties of nanomaterials that make them good sensing agents
Device Applications of Silicon Nanocrystals and Nanostructures CRC Press
When you look closely, nature is nanotechnology at its finest. From a single cell, a factory all by itself, to complex systems, such as the nervous system or the human eye, each is composed of specialized nanostructures that exist to perform a specific function. This same beauty can be mirrored when we interact with the tiny physical world that is the realm of quantum

mechanics. This book focuses on the application of nanotechnology to modern semiconductor optoelectronic devices. Electrons, photons, and even thermal properties can all be engineered at the nanolevel. The 2D quantum well, possibly the simplest aspect of nanotechnology, has dramatically enhanced the efficiency and versatility of electronic and optoelectronic devices. While this area alone is fascinating, nanotechnology has now progressed to 1D (quantum wire) and 0D (quantum dot) systems that exhibit remarkable and sometimes unexpected behaviors. With these components serving as the modern engineer's building blocks, it is a brave new world we live in, with endless possibilities for new technology and scientific discovery.

Wide Band Gap Semiconductor Nanostructures for Optoelectronic Applications

LAP Lambert Academic Publishing

This book provides a comprehensive overview of the state-of-the-art in the development of semiconductor nanostructures and nanophotonic devices. It covers epitaxial growth processes for GaAs- and GaN-based quantum dots and quantum wells, describes the fundamental optical, electronic, and vibronic properties of nanomaterials, and addresses the design and realization of various nanophotonic devices. These include energy-efficient and high-speed vertical cavity surface emitting lasers (VCSELs) and ultra-small metal-cavity nano-lasers for applications in multi-terabus systems; silicon photonic I/O engines based on the hybrid integration of VCSELs for highly efficient chip-to-chip communication; electrically driven quantum key systems based on q-bit and entangled photon emitters and their implementation in real information networks; and AlGaN-based deep UV laser diodes for applications in medical diagnostics, gas sensing, spectroscopy, and 3D printing. The experimental results are accompanied by reviews of theoretical models that describe nanophotonic devices and their base materials. The book details how optical transitions in the active materials, such as semiconductor quantum dots and quantum wells, can be described using a quantum approach to the dynamics of solid-state electrons under quantum confinement and their interaction with phonons, as well as their external pumping by electrical currents. With its broad and detailed scope, this book is indeed a cutting-edge resource for researchers, engineers and graduate-level students in the area of semiconductor materials, optoelectronic devices and photonic systems.

Semiconductor Nanostructures Towards Electronic and Optoelectronic Device Applications II (Symposium K, E-MRS 2009 Spring Meeting) Springer Nature

The explosion of the science of mesoscopic structures is having a great impact on physics and electrical engineering because of the possible applications of these structures in microelectronic and optoelectronic devices of the future. This volume of Solid State Physics consists of two comprehensive and authoritative articles that discuss most of the physical problems that have so far been identified as being of importance in semiconductor nanostructures. Much of the volume is tutorial in characture--while at the same time time presenting current and vital theoretical and experimental results and a copious reference list--

so it will be essential reading to all those taking a part in the research and development of this emerging technology.

Optical Properties of III-V Semiconductor Nanostructures and Quantum Wells

Elsevier
Reducing the size of a coherently grown semiconductor cluster in all three directions of space to a value below the de Broglie wavelength of a charge carrier leads to complete quantization of the energy levels, density of states, etc. Such “quantum dots” are more similar to giant atoms in a dielectric cage than to classical solids or semiconductors showing a dispersion of energy as a function of wavevector. Their electronic and optical properties depend strongly on their size and shape, i.e. on their geometry. By designing the geometry by controlling the growth of QDs, absolutely novel possibilities for material design leading to novel devices are opened. This multiauthor book written by world-wide recognized leaders of their particular fields and edited by the recipient of the Max-Born Award and Medal 2006 Professor Dieter Bimberg reports on the state of the art of the growing of quantum dots, the theory of self-organised growth, the theory of electronic and excitonic states, optical properties and transport in a variety of materials. It covers the subject from the early work beginning of the 1990s up to 2006. The topics addressed in the book are the focus of research in all leading semiconductor and optoelectronic device laboratories of the world.
Theory of Transport Properties of Semiconductor Nanostructures
OUP Oxford
In the last couple of decades, high-performance electronic and optoelectronic devices based on semiconductor heterostructures have been required to obtain increasingly strict and well-defined performances, needing a detailed control, at the atomic level, of the structural composition of the buried interfaces. This goal has been achieved by an improvement of the epitaxial growth techniques and by the parallel use of increasingly sophisticated characterization techniques and of refined theoretical models based on ab initio approaches. This book deals with description of both characterization techniques and theoretical models needed to understand and predict the structural and electronic properties of semiconductor heterostructures and nanostructures. Comprehensive collection of the most powerful characterization techniques for semiconductor heterostructures and nanostructures Most of the chapters are authored by scientists that are among the top 10 worldwide in publication ranking of the specific field Each chapter starts with a didactic introduction on the technique The second part of each chapter deals with a selection of top examples highlighting the power of the specific technique to analyze the properties of semiconductors
Nanomaterials for Sensing and Optoelectronic Applications
Academic Press
This book contains a compilation of papers presented in Symposium T, Self-Organized Processes in Semiconductor Epitaxy, during the 2003 MRS Fall Meeting in Boston, Massachusetts. It also includes papers presented in joint sessions with Symposium N, Quantum Dots, Nanoparticles, and Nanowires, and Symposium Z, Progress in Compound Semiconductor Materials III - Electronic and Optoelectronic Applications. The goal of the volume is to address issues related to the understanding,

control, and applications of several self-organized processes in semiconductor epitaxy, including strain-induced self-assembly; clustering, alloy phase separation and compositional modulation; and long- and short-range ordering. Topics include: morphological evolution - patterning and islanding; semiconductor nanostructure; quantum dots - ordering and patterning; III-V self-organized nanostructures; quantum dots and wires - structure, spectroscopy and transport; quantum dots and wires - devices; spins in semiconductor nanostructures; composition modulation and atomic ordering.

One-Dimensional Nanostructures

John Wiley & Sons
When solids are reduced to the nanometer scale, they exibit new and exciting behaviours which constitute the basis for a new generation of electronic devices. Nanotechnology for Microelectronics and Optoelectronics outlines in detail the fundamental solid-state physics concepts that explain the new properties of matter caused by this reduction of solids to the nanometer scale. Applications of these electronic properties is also explored, helping students and researchers to appreciate the current status and future potential of nanotechnology as applied to the electronics industry. Explains the behavioural changes which occur in solids at the nanoscale, making them the basis of a new generation of electronic devices Laid out in text-reference style: a cohesive and specialised introduction to the fundamentals of nanoelectronics and nanophotonics for students and researchers alike

Inorganic Flexible Optoelectronics Springer
Recent developments in the technology of silicon nanocrystals and silicon nanostructures, where quantum-size effects are important, are systematically described including examples of device applications. Due to the strong quantum confinement effect, the material properties are freed from the usual indirect- or direct-bandgap regime, and the optical, electrical, thermal, and chemical properties of these nanocrystalline and nanostructured semiconductors are drastically changed from those of bulk silicon. In addition to efficient visible luminescence, various other useful material functions are induced in nanocrystalline silicon and periodic silicon nanostructures. Some novel devices and applications, in fields such as photonics (electroluminescence diode, microcavity, and waveguide), electronics (single-electron device, spin transistor, nonvolatile memory, and ballistic electron emitter), acoustics, and biology, have been developed by the use of these quantum-induced functions in ways different from the conventional scaling principle for ULSI.