Semiconductor Nanomaterials

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Nanoparticles or nanocrystals made of metals, semiconductors, or oxides are of particular interest for their mechanical, electrical, magnetic, optical, chemical and other properties. Nanoparticles have been used as quantum dots and as chemical catalysts such as nanomaterial-based catalysts.

Nanomaterials - Wikipedia

Semiconductor Nanoparticles Proceedings of the International Conference on Colloid and Surface Science. Yoshikuni Uchida, Kazunori Matsui, in... Nanoshells*. Semiconductor nanoparticles are fluorescent materials. The coating of silica is applied to them to decrease... Semiconductor Glass ...

Semiconductor Nanoparticles - an overview ¦ ScienceDirect ...

Semiconductor nanomaterials have shown their applicability for a range of technologies because of their enhanced and improved physical, chemical, and functional properties. Such nanomaterials are used for a variety of potential applications, from electronics to sensor devices to energy, environmental remediation, medical fields, and so on.

Nanomaterials ¦ Special Issue : Semiconductor ...

1. Introduction A semiconductor is a material that has an electrical conductivity between a conductor and an insulator. 2. Introductions to Nanoscience and Nanotechnology In the past few decades, nanoscience and nanotechnology have been... 3. Semiconductor Nanoparticles Semiconductor nanocrystals ...

Semiconductor Nanomaterials, Methods and Applications: A ...

1 CHAPTER 1 SEMICONDUCTOR NANOMATERIALS 1.1 INTRODUCTION Nanocrystalline materials are single or multi-phased polycrystalline solids with a grain size of a few nanometers, typically less than 100 nm.

CHAPTER 1 SEMICONDUCTOR NANOMATERIALS
Challa Kumar is currently the Director of Nanofabrication & Nanomaterials at the Center for Advanced Microstructures and Devicees (CAMD), Baton Rouge, USA. He is also the President and CEO of Magnano Technologies, a company established to commercialize nanomaterials for applications in life sciences.

Semiconductor Nanomaterials ¦ Nanomaterials ...
Rational design and robust control of semiconductor nanostructures are generally desired to augment the material properties for the device applications. We employ bottom-up approaches using vapor-based growth methods (CVD, VLS, etc) to synthesize 1D or 2D nanostructures.

Shin Research Group at INHA ¦ Semiconductor Nanomaterials ...
Nanoscale silica is used as a filler in dental fillings. The optical properties of the nanomaterials are used to form optical detectors, sensors, lasers, displays, solar cells. This property is also used in biomedicine and photoelectrochemistry. In microbial fuel cells, the electrodes are made up of carbon nanotubes.

Nanomaterials - Classification, Properties & Applications
1D nano‐semiconductor material, such as ZnO NWs, III‐V semiconductor NWs, and so on, can range in diameter from a few nanometers to hundreds of nanometers, while lengths are unrestricted and can even reach tens of hundreds of microns. 89 One‐dimensionality leads to the unique properties of these materials. The structural properties, electrical and optical properties are very different from ordinary materials.

Recent advances in low‐dimensional semiconductor ...
Abstract Surface-enhanced Raman scattering (SERS)-active nanomaterials have extended from noble metals and transition metals to semiconductor materials, since the first discovery of SERS in the mid-1970s.

Semiconductor-enhanced Raman scattering: active ...
Given the unique physicochemical properties of noble metal and semiconductor nanomaterials, the enantioselective analyses are classified into three categories: fluorescence-based, colorimetry-based, and circular dichroism-based ones.

Delving noble metal and semiconductor nanomaterials into ...
In recent years, the rational design and engineering of functionalized inorganic semiconductor nanomaterials, such as TiO 2, ZnO, PbSe, etc, have attracted incessant research attention due to their intrinsic, fascinating, and novel properties for various practical applications. To date, synthesis of functionalized inorganic semiconductor nanomaterials with controlled size, morphology, and crystal phase is of the utmost importance to fine-tune the physico-chemical properties for widespread ...

Functionalized Inorganic Semiconductor Nanomaterials ...
Abstract Metal halide perovskites are a family of semiconductor materials with exciting properties such as long charge carrier diffusion lengths, ease of synthesis and composition

tunability, and remarkable defect tolerance.

Colloidal Halide Perovskite Nanoplatelets: An Exciting New ...
Currently, semiconductor nanomaterials and devices are still in the research stage, but they are pro mising for applications in many fields, such as solar cells, nanoscale electronic devices, light-emitting nano devices, laser technology, waveguide, chemicals and biosensors.

Semiconductor Nanomaterials, Methods and Applications: A ...
Challa Kumar is currently the Director of Nanofabrication & Nanomaterials at the Center for Advanced Microstructures and Devicees (CAMD), Baton Rouge, USA. He is also the President and CEO of...

Semiconductor Nanomaterials - Google Books
Electrochemically Generated versus Photoexcited Luminescence from Semiconductor Nanomaterials: Bridging the Valley between Two Worlds. Peng Wu † ‡, Xiandeng Hou ‡, Jing-Juan Xu * †, and ; Hong-Yuan Chen * † §

Electrochemically Generated versus Photoexcited ...
Towards highly efficient photoanodes: boosting sunlight-driven semiconductor nanomaterials for water oxidation J. Gan, X. Lu and Y. Tong, Nanoscale, 2014, 6, 7142 DOI: 10.1039/C4NR01181C If you are not the ...

Towards highly efficient photoanodes: boosting sunlight ...
The process begins with the synthesis of different semiconductor nanomaterials, such as single-walled carbon nanotubes and single-crystal micro- and nanoscale wires and ribbons of gallium nitride,...

Heterogeneous Three-Dimensional Electronics by Use of ...
Doped Semiconductor Nanomaterials Buy Article: $106.61 + tax (Refund Policy)

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Abstract Anisotropic II–VI semiconductor nanocrystals and nanoparticles have become important building blocks for (potential) nanotechnological applications. Even though a wide variety of differently shaped nanoparticles of this class can be prepared, the underlying mechanisms are mostly not fully understood.

The must-have ten-volume successor to the critically acclaimed Nanotechnologies for the Life Sciences series, Nanomaterials for the Life Sciences, 10 Volume Set provides an excellent, in-depth overview of all nanomaterial types and their uses in the life sciences. Each volume is dedicated to a specific material class and covers fundamentals, synthesis strategies, structure-property relationships, material behavior fine-tuning, biological effects, and applications in the life sciences. This landmark set provides materials scientists, chemists, biologists, molecular biologists, clinical physicists, physiological chemists, medicinal chemists, and toxicologists with essential awareness of life science applications.

This book is an overview of the strategies to generate high-quality films of one-dimensional semiconductor nanostructures on flexible substrates (e.g., plastics) and the use of them as building blocks to fabricating flexible devices (including electronics, optoelectronics,

sensors, power systems). In addition to engineering aspects, the physics and chemistry behind the fabrication and device operation will also be discussed as well. Internationally recognized scientists from academia, national laboratories, and industries, who are the leading researchers in the emerging areas, are contributing exceptional chapters according to their cutting-edge research results and expertise. This book will be an on-time addition to the literature in nanoscience and engineering. It will be suitable for graduate students and researchers as a useful reference to stimulate their research interest as well as facilitate their research in nanoscience and engineering. Considers the physics and chemistry behind fabrication and device operation Discusses applications to electronics, optoelectronics, sensors and power systems Examines existing technologies and investigates emerging trends

This book introduces the wider field of functional nanomaterials sciences, with a strong emphasis on semiconductor photonics. Whether you are studying photonic quantum devices or just interested in semiconductor nanomaterials and their benefits for optoelectronic applications, this book offers you a pedagogical overview of the relevant subjects along with topical reviews. The book discusses different yet complementary studies in the context of ongoing international research efforts, delivering examples from both fundamental and applied research to a broad readership. In addition, a hand-full of useful optical techniques for the characterization of semiconductor quantum structures and materials are addressed. Moreover, nanostructuring methods for the production of low-dimensional systems, which exhibit advantageous properties predominantly due to quantum effects, are summarized. Science and engineering professionals in the interdisciplinary domains of nanotechnology, photonics, materials sciences, and quantum physics can familiarize themselves with selected highlights with eyes towards photonic applications in the fields of two-dimensional materials research, light–matter interactions, and quantum technologies.

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.

Engineering of nanophase materials and devices is of vital interest in electronics, semiconductors and optics, catalysis, ceramics and magnetism. Research associated with nanoparticles has widely spread and diffused into every field of scientific research, forming a trend of nanocrystal engineered materials. Electrochemical methods are widely used for the preparation of nanoparticles and the electrochemical properties of such nanomaterials are most relevant for their applications. This comprehensive reference work will appeal to advanced graduate students and researchers in the field specialized in electrochemistry, materials physics and materials science.

Metal Semiconductor Core-Shell Nanostructures for Energy and Environmental Applications provides a concise, scholarly overview of current research into the characterization of metal semiconductor core-shell nanostructures; the book shows how their properties can be best used in energy and environmental applications, particularly for solar cell and catalysis application. Coverage is also given to the effect of metal nanoparticle for charge generation or charge separation. The book is a valuable resource for academic researchers working in the areas of nanotechnology, sustainable energy and chemical engineering, and is also of great use to engineers working in photovoltaic and pollution industries. Includes a clear method for synthesis of core-shell nanomaterials Explores how metal semiconductor core-shell nanostructures can be used to improve the efficiency of solar cells Explains how the characteristics of metal semiconductor core-shell nanostructures make them particularly useful for sustainable energy and environmental applications