OMB No. 0013562798635

Carrier Dynamics And Photoluminescence Quenching Mechanism

Introduction to Time-Resolved Emission Spectroscopy by Dr. Kenneth Hanson Photoluminescence and Transient Absorption in Photodynamic Therapy Intro to TCSPC - Time Correlated Single Photon Counting - by Jeff DuBose Absorption and Photoluminesence Mechanism in Cu+:CdSe Semiconductor Nanocrystals UNSW SPREE 20171- 03 Friedemann Heinz - Transient photoluminescence spectroscopy What is Fluorescence? What is the Main Driver of Quenching? - Ying Zu Fundamentals of Fluorescence Chapter 15: Time-Resolved Spectroscopy | CHM 309 | 148 PHOTOLUMINESCENCE (PL) Photoluminescence Mark Brongersma | Nanophotonics for solar energy harvesting | GCEP Symposium 2015 Michal Lipson, \"The Revolution of Silicon Photonics\" | KNI Distinguished Seminar Yayu Wang on

\"Quantum Anomalous Hall Effect \u0026 Interface Superconductivity in 2D Systems\" Thermally Activated Delayed Fluorescence Emitter Characterisation - Poster Presentation Photoluminescence Spectrometer | Photoluminescence Spectroscopy | PL| Band Gap |Spatium |S1E4 | Fluorescence Spectroscopy Intro (Lumina Fluorometer) 8. Luminescence in solids describe photoluminescence Photoluminescence Chapter 2 J Durrant: Charge carrier dynamics in polymeric photocatalysts for solar driven hydrogen generation luminescence tutorial Interfaces between color centers and photons Understanding Phonon Transport Using Lattice Dynamics and Molecular Dynamics – Asegun Henry Part 1 Colloquium: Oliver Monti - When Like meets Unlike: Electronic Structure and Dynamics at Interfaces Photoluminescence (PL) Spectra Lecture 14: Color (CMU 15-462/662) Exploring the World of Fluorescence through Steady State Photoluminescence (SSPL) Photoluminescence Chapter 6

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Exciton Dynamics in Lead Halide Perovskite Nanocrystals

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Semiconductor Quantum Dots

High-Performance Carbon-Based Optoelectronic Nanodevices

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Optical Properties of Semiconductor Nanocrystals
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Calculations and Simulations of Low-Dimensional Materials
Ultrashort Pulse Lasers and Ultrafast Phenomena

Carrier Dynamics And Photoluminescence Quenching Mechanism

OMB No. 0013562798635 edited by

KEITH TOWNSEND

FINE PARTICLES

Science and Technology

Springer Science & Business Media
Colloidal nanocrystals show much promise as an optoelectronics architecture due to facile control over electronic properties afforded by chemical control of size, shape, and heterostructure. Unfortunately, realizing practical devices has been forestalled by the ubiquitous presence of charge "trap" states which compete with band-edge excitons and result in limited device efficiencies. Little is known about the defining characteristics of these traps, making engineered strategies for their removal difficult. This thesis outlines pulsed optically detected magnetic resonance as a powerful spectroscopy of the chemical and electronic nature of these deleterious states. Counterintuitive for such heavy atom materials, some trap species possess very long spin coherence lifetimes (up to 1.6 µs). This quality allows use of the trapped charge's magnetic moment as a local probe of the trap state itself and its local environment. Beyond state characterization, this spectroscopy can demonstrate novel effects in heterostructured nanocrystals, such as spatially-remote readout of spin information and the coherent control of light harvesting yield.

Royal Society of Chemistry
This book focuses on the photoelectric nanodevices

based on carbon nanostructures, such as carbon nanotubes, graphene and related heterojunctions. The synthesis of carbon nanostructures and device fabrication are simply given. The interface charge transfer and the performance enhancement in the photodetectors and solar cells are comprehensively introduced. Importantly, carbon allotropes behave as high-mobility conductors or bandgap-tunable semiconductors depending on the atomic arrangements, the direct motivation is to fabricate all-carbon nanodevices using these carbon nanomaterials as building blocks. The photoelectric nanodevices based on all-carbon nanostructures have increasingly attracted attention in the future. The book offers a valuable reference guide to carbon-based photoelectric devices for researchers and graduate school students in the field. It will also benefit all researchers who investigate photoelectric nanodevices and photoelectric conversion with relevant frontier theories and concepts.

Exciton Dynamics in Lead Halide Perovskite Nanocrystals Springer Science & Business Media

Deep and detailed discussions on chemistry, chemical physics, photoelectrochemistry, photophysics, photocatalysis and possible applications of nanostructured semiconductor materials have shown increasing interest in the matter by scientists representing various research areas as

well as industrial enterprises. Indeed, solar energy conversion and ch

Modular Chemistry CRC Press

Calculations and Simulations of Low-Dimensional Materials A comprehensive guide to methods for calculating and simulating the properties of low-dimensional materials Two-dimensional materials are those, such as graphene and 2D oxides, whose thickness is so small as to approach the atomic scale. Potential applications for these materials exist in an enormous range of scientific and industrial fields. A previous era of low-dimensional materials focused on direct experimentation to demonstrate the properties, reactions, and potential applications of these materials; however, in recent years, calculation and simulation have been shown to have considerable predictive power, reducing the period between design and deployment of these potentially critical materials. Calculations and Simulations of Low-Dimensional Materials offers the first comprehensive survey of this exciting new approach to low-dimensional materials. It guides readers through the foundational physics and through a range of calculation and simulation methods, each with different predictive capacities. Mastery of these methods will enable readers to narrowly tailor the properties of particular materials towards real-world applications, providing

confidence in the underlying mechanics and in the range of possible outcomes. Calculations and Simulations of Low-Dimensional Materials readers will also find: Broad coverage of material properties, including electronic, spin, magnetic, photonic, optical, electrochemical and transport properties Discussion of potential applications in areas such as electronics, spintronics, and valleytronics Examination of further potential applications regarding quantum Hall phase, photonics, optoelectronics, multiferroic, and photocatalysis Calculations and Simulations of Low-Dimensional Materials is a useful reference for materials scientists, electrochemists, inorganic chemists, physical chemists, photochemists, and the libraries that support these professions. Semiconductor Quantum Dots John Wiley & Sons The series Topics in Current Chemistry Collections presents critical reviews from the journal Topics in Current Chemistry organized in topical volumes. The scope of coverage is all areas of chemical science including the interfaces with related disciplines such as biology, medicine and materials science. The goal of each thematic volume is to give the non-specialist reader, whether in academia or industry, a comprehensive insight into an area where new research is emerging which is of interest to a larger scientific audience. Each review within the volume critically surveys

one aspect of that topic and places it within the context of the volume as a whole. The most significant developments of the last 5 to 10 years are presented using selected examples to illustrate the principles discussed. The coverage is not intended to be an exhaustive summary of the field or include large quantities of data, but should rather be conceptual, concentrating on the methodological thinking that will allow the non-specialist reader to understand the information presented. Contributions also offer an outlook on potential future developments in the field.

High-Performance Carbon-Based Optoelectronic Nanodevices John Wiley & Sons

Contains papers and discussions from a September 1996 workshop on an emerging field which combines insights from chemistry, physics, materials science, biology, and engineering. Subjects include modular assembly of surface heterostructures from inorganic clusters and polyelectrolytes, photopatterning to create new structures on surfaces, the control of DNA structure, assembly of oriented nanometer channels on organic layers, and semiconductor nanocrystals as molecules and building blocks. Other topics include self-assembly of molecular materials, cycloadducts of carbon rings, and crystal engineering of ionic solids. Annotation copyrighted by Book News, Inc., Portland, OR

UV-VIS and Photoluminescence Spectroscopy for Nanomaterials Characterization

John Wiley & Sons
The third generation of solar cells includes those based on semiconductor quantum dots. This sophisticated technology applies nanotechnology and quantum mechanics theory to enhance the performance of ordinary solar cells. Although a practical application of quantum dot solar cells has yet to be achieved, a large number of theoretical calculations and experimental studies have confirmed the potential for meeting the requirement for ultra-high conversion efficiency. In this book, high-profile scientists have contributed tutorial chapters that outline the methods used in and the results of various quantum dot solar cell designs, including quantum dot intermediate band solar cells, hot electron quantum dot solar cells, quantum-dot sensitized solar cells, colloidal quantum dot solar cells, hybrid polymer-quantum dot solar cells, and MEG quantum dot solar cells. Both theoretical and experimental approaches are described. Quantum Dot Solar Cells helps to connect the fundamental laws of physics and the chemistry of materials with advances in device design and performance. The book can be recommended for a broad audience of chemists, electrical engineers, and materials scientists, and is suitable for use in courses

on materials and device design for advanced and future optoelectronics. *Conjugated Polymer Nanostructures for Energy Conversion and Storage Applications* Springer Science & Business Media This book describes the basic physical principles of techniques to generate and ultrashort pulse lasers and applications to ultrafast spectroscopy of various materials covering chemical molecular compounds, solid-state materials, exotic novel materials including topological materials, biological molecules and bio- and synthetic polymers. It introduces non-linear optics which provides the basics of generation and measurement of pulses and application examples of ultrafast spectroscopy to solid state physics. Also it provide not only material properties but also material processing procedures. The book describes also details of the world shortest visible laser and DUV lasers developed by the author's group. It is composed of the following 12 Sections: The special features of this book is that it is written by a single author with a few collaborators in a systematic way. Hence it provides a comprehensive and systematic description of the research field of ultrashort pulse lasers and ultrafast spectroscopy. Generation of ultrashort pulses in deep ultraviolet to near infrared Generation of ultrashort pulses in terahertz Carrier envelope phase (CEP) Simple NLO processes with a few colors Multi-color involved

NLO processes Multi-color ultrashort pulse generation NLO materials NLO processes in time-resolved spectroscopy Low dimension materials Conductors and superconductors Chemical reactions and material processing Photobiological reactions

Connecting the Semiconductor Nanocrystal Surface to Optical Properties

John Wiley & Sons
The only comprehensive treatment of nanophotonics currently available Photonics is an all-encompassing optical science and technology which has impacted a diverse range of fields, from information technology to health care. Nanophotonics is photonic science and technology that utilizes light-matter interactions on the nanoscale, where researchers are discovering new phenomena and developing technologies that go well beyond what is possible with conventional photonics and electronics. These new technologies could include efficient solar power generation, high-bandwidth and high-speed communications, high-capacity data storage, and flexible- and high-contrast displays. In addition, nanophotonics will continue to impact biomedical technologies by providing new and powerful diagnostic techniques, as well as light-guided and activated therapies. Nanophotonics provides the only available comprehensive

treatment of this exciting, multidisciplinary field, offering a wide range of topics covering: * Foundations * Materials * Applications * Theory * Fabrication Nanophotonics introduces students to important and timely concepts and provides scientists and engineers with a cutting-edge reference. The book is intended for anyone who wishes to learn about light-matter interactions on the nanoscale, as well as applications of photonics for nanotechnology and nanobiotechnology. Written by an acknowledged leader in the field, this text provides an essential resource for those interested in the future of materials science and engineering, nanotechnology, and photonics.

Global Sustainability

CRC Press Handbook of Organic Materials for Electronic and Photonic Devices, Second Edition, provides an overview of the materials, mechanisms, characterization techniques, structure-property relationships, and most promising applications of organic materials. This new release includes new content on emerging organic materials, expanded content on the basic physics behind electronic properties, and new chapters on organic photonics. As advances in organic materials design, fabrication, and processing that enabled charge unprecedented carrier mobilities and

power conversion efficiencies have made dramatic advances since the first edition, this latest release presents a necessary understanding of the underlying physics that enabled novel material design and improved organic device design. Provides a comprehensive overview of the materials, mechanisms, characterization techniques, and structure property relationships of organic electronic and photonic materials Reviews key applications, including organic solar cells, light-emitting diodes electrochemical cells, sensors, transistors, bioelectronics, and memory devices New content to reflect latest advances in our understanding of underlying physics to enable material design and device fabrication *Unconventional Thin Film Photovoltaics* Elsevier Organic (opto)electronic materials have received considerable attention due to their applications in perovskite and flexible electronics, OPVs and OLEDs and many others. Reflecting the rapid growth in research and development of organic (opto)electronic materials over the last few decades, this book provides a comprehensive coverage of the state of the art in an accessible format. It presents the most widely recognized fundamentals, principles, and mechanisms along with representative examples, key experimental data, and over 200 illustrative figures.

Metal Halide Perovskite Crystals: Growth Techniques, Properties and Emerging Applications

CRC Press Comprehensive Coordination Chemistry II (CCC II) is the sequel to what has become a classic in the field, Comprehensive Coordination Chemistry, published in 1987. CCC II builds on the first and surveys new developments authoritatively in over 200 newly comissioned chapters, with an emphasis on current trends in biology, materials science and other areas of contemporary scientific interest.

Issues in Earth Sciences, Geology, and Geophysics: 2011 Edition CRC Press Covering both organic materials, where recent advances in the understanding of device physics is driving progress, and the newly emerging field of mixed halide perovskites, which are challenging the efficiencies of conventional thin film PV cells, this book provides a balanced overview of the experimental and theoretical aspects of these two classes of solar cell. The book explores both the experimental and theoretical aspects of these solar cell classes. Emphasis is placed on understanding the fundamental physics of the devices. The book also discusses modelling over many length scales, from

nano to macro. The first book to cover perovskites, this is an important reference for industrialists and researchers working in energy technologies and materials.
Proceedings of the International Symposium on Pits and Pores--Formation, Properties, and Significance for Advanced Luminescent Materials Springer Nature
Porous silicon is rapidly attracting increasing interest from various fields, including optoelectronics, microelectronics, photonics, medicine, sensor and energy technologies, chemistry, and biosensing. This nanostructured and biodegradable material has a range of unique properties that make it ideal for many applications. This book, the third of a
Ultrafast Dynamics and Laser Action of Organic Semiconductors World Scientific
Molecular GeomicrobiologyWalter de Gruyter GmbH & Co KG
Handbook of Organic Materials for Electronic and Photonic Devices John Wiley & Sons
The first in-depth treatment of the synthesis, processing, and characterization of nanomaterials using lasers, ranging from fundamentals to the latest research results, this handy reference is divided into two main sections. After introducing the concepts of lasers, nanomaterials, nanoarchitectures and laser-material interactions in the first three chapters, the book goes on to discuss the synthesis of

various nanomaterials in vacuum, gas and liquids. The second half discusses various nanomaterial characterization techniques involving lasers, from Raman and photoluminescence spectroscopies to light dynamic scattering, laser spectroscopy and such unusual techniques as laser photo acoustic, fluorescence correlation spectroscopy, ultrafast dynamics and laser-induced thermal pulses. The specialist authors adopt a practical approach throughout, with an emphasis on experiments, set-up, and results. Each chapter begins with an introduction and is uniform in covering the basic approaches, experimental setups, and dependencies of the particular method on different parameters, providing sufficient theory and modeling to understand the principles behind the techniques.

Quantum Dot Solar Cells

Woodhead Publishing

"The intricate chemistry of the surface of semiconductor nanocrystals is crucial to tailoring their optical properties to a myriad of applications. To this end semiconductor nanocrystals with diameters of ≤2 nm are ideal test systems as most of their atoms lie at the surface and they display both a core excitonic and a redshifted surface emission band. In this thesis, temperature-dependent photoluminescence studies demonstrate that different ligand passivations alter the electron-transfer

parameters of a recently developed Marcus-Jortner type electron-transfer model employing a single displaced surface state. In addition, the effects of a common ligand exchange procedure on surface stoichiometry and carrier dynamics reveal a previously unknown link between the presence of cadmium phosphonate ligands and the radiative recombination of surface trapped holes. Moreover, a detailed analysis of the ligand exchange reaction explains previously contradictory experimental evidence that suggested that N-butylamine functions as a static quencher, rather than a fluorescence enhancing ligand. Finally, charge transfer and external heavy atom quenching are employed to test the idea that surface emission is caused by a single surface state. The fact that neither quenching experiment induces spectral changes to the surface emission band indicates that the existence of a single surface state is more likely than the traditional view of "deep-trap" emission, i.e. a myriad of defects at slightly different energies. Further it is shown that the driving force for core quenching is higher than for the surface state, which confirms theoretic predictions by the model. This dissertation provides a new understanding of nanocrystal surface charge trapping, emphasizing its connection with the specific chemistry of the surface. " -- Nanomaterials John Wiley

& Sons
This book focuses on holistic approaches to sustainability in all sectors of environment, energy, building, and infrastructure to achieve the best-balanced global environmental, energy, building, infrastructure, transportation, and water technologies (EBITWs). It presents a series of solutions based on innovative research and applications for building a sustainable Earth for future generations. Simply, the goal of this book is to define the context of instigation to think through the scientific theories and practical technical applications of sustainability for building a better planet. Naturally this book explains a series of mechanisms to develop a sustainable world by implementing mainly practicing the following areas of Sustainable Energy, Sustainable Housing and Building Technology, Sustainable Water, Infrastructure, and Transportation Technology, Sustainable Environment which are, very much interconnected to secure a global environmental equilibrium.

Optical Properties of Semiconductor Nanocrystals CRC Press
Examines the optical properties of low-dimensional semiconductor structures, a hot research area - for graduate students and researchers.

Comprehensive Coordination Chemistry II Springer Nature
Spurred on by extensive research in recent years, organic semiconductors

are now used in an array of areas, such as organic light emitting diodes (OLEDs), photovoltaics, and other optoelectronics. In all of these novel applications, the photoexcitations in organic semiconductors play a vital role. Exploring the early stages of photoexcitations that follow photon absorption, Ultrafast Dynamics and Laser Action of Organic Semiconductors presents the latest research investigations on photoexcitation ultrafast dynamics and laser action in pi-conjugated polymer films, solutions, and microcavities. In the first few chapters, the book examines the interplay of charge (polarons) and neutral (excitons) photoexcitations in pi-conjugated polymers, oligomers, and molecular crystals in the time domain of 100 fs–2 ns. Summarizing the state of the art in lasing, the final chapters introduce the phenomenon of laser action in organics and cover the latest optoelectronic applications that use lasing based on a variety of cavities, such as distributed feedback-type cavity. With contributions from a host of renowned international experts, this book explores the underlying processes in both existing and potential organic optoelectronic applications. It provides a broad overview of the scientific debate in the field of photophysics in organic semiconductors.

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