Electronic Structure And Optical Properties Of Se

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Electronic Structure and Optical Properties of III-V and II-VI Semiconductor Superlattices Neil Fraser Johnson 1989

Electronic Structure and Optical Properties of Lead Sulphide and Lead Selenide Nanocrystal Quantum Dots Inuk Kang 1998 The electronic structure and optical properties of PbS and PbSe nanocrystal quantum dots are the main topics of this dissertation. In chapter 1, recent advances in the study of II-VI quantum dots are briefly summarized and the investigation of PbS and PbSe quantum dots is motivated. Chapter 2 presents a detailed description of the electronic and linear optical properties of PbS and PbSe quantum dots based on a four-band envelope-function formalism. This is the first self-consistent multi-band calculation of the electronic structure of these materials. The electronic structure of PbS and PbSe quantum dots is successfully described using a four-band $k\cdot p$ Hamiltonian which accounts for the band anisotropy and interband interaction of PbS and PbSe. The effects of many-body interactions and the intervalley interaction are also given. Chapter 3 describes a novel experimental technique, spectrally-resolved two-beam coupling, for measuring very small optical nonlinearity. The technique is based on spectrally resolving a weak probe beam which is modulated by a strong pump beam in a nonlinear medium. It is pertinent for measuring the nonlinear response of dilute quantum dot samples since the nonlinear response of individual nanocrystals can be obscured by the response of the host material. In Chapter 3, the results of two-photon absorption spectroscopy of PbS quantum dots are presented. For systems with inversion symmetry, two-photon spectroscopy probes optical transitions not allowed by the one-photon selection rules, and thus gives complementary information of the electronic structure. Unlike for II-VI quantum dots, two-photon spectroscopy of PbS quantum dots should yield unambiguous

information on the symmetry of the electronic states due to the centrosymmetric lattice and simple electronic structure. The measurement reveals that the electronic states of PbS quantum dots are not parity eigenstates. The implications of this measurement for other quantum dots are discussed. In chapter 5, some thoughts on future directions in the research of PbS and PbSe quantum dots are given. Finally description of the numerical routines that are needed to calculate the electronic structure of PbS and PbSe quantum dots is given in appendix.

Electronic Structure and Magneto-Optical Properties of Solids Victor Antonov 2006-05-05 The aim of this book is to review recent achievements in thetheoretical investigations of the electronic structure, optical, magneto-optical (MO), and x-ray magnetic circular dichroism (XMCD)properties of compounds and Multilayered structures.Chapter 1 of this book is of an introductory character and presentsthe theoretical foundations of the band theory of solids such as thedensity functional theory for ground state properties of solidsincluding local density approximation (LDA). It also presents somemodifications to the LDA, such as gradient correction, self-interaction correction, LDA+U method, orbital polarizationcorrection, GW approximation, and dynamical mean- field theory. Thedescription of the magneto-optical effects and linear response theoryare also presented.The book describes the MO properties for a number of 3d materials, such as elemental ferromagnetic metals (Fe, Co and Ni) andparamagnetic metals in external magnetic fields (Pd and Pt), someimportant 3d compounds such as XPt3 (X=V, Cr, Mn, Fe and Co), Heusleralloys, chromium spinel chalcogenides, MnB and strongly correlatedmagnetite Fe304. It also describes the recent achievements in both theexperimental and theoretical investigations of the electronicstructure, optical and MO properties of transition metal multilayeredstructures (MLS).The book presents also the MO properties of f band ferromagneticmaterials: Tm, Nd, Sm, Ce and La monochalcogenides, some important Y

Optical Properties and Electronic Structure of Metals and Alloys F. Abelès 1966

Optical Properties and Electronic Structure of Metals and Alloys M. R. Steel 1972

Electronic Structure and Optical Properties of Solid Methane A. Barry Kunz 1983

Theoretical and Experimental Studies of Ba2SmTaO6 on Crystal Structure, Electronic Structure and Optical Properties 2018

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Calculation of the Electronic Band Structure and Optical Properties of 3C SiC, BP, BN, and 2H SiC Using the Nonlocal Empirical Pseudopotential Method Louis Austin Hemstreet 1972

Electronic Structure and Optical Properties of III-N Nanowires Alejandro Molina Sánchez 2011

Electronic Structure and Optical Properties of Quantum Dots Thique Huong Nguyen 2001

Calculations of the Electronic Structure and Optical Properties of Strained II-VI Superlattices D. O. Hall 1991

Optical Properties and Band Structure of Semiconductors David L. Greenaway 2015-12-04 Optical Properties and Band Structure of Semiconductors, Volume 1 presents the experimental studies of the fundamental energy band structure of semiconductors and insulators. This book provides detailed information of the available measurement methods and results for a large number of both cubic and non-cubic materials. Comprised of 10 chapters, this volume begins with an overview of the fundamental band structure of semiconductors. This text then discusses the instrumentation and methods available for the measurement of absorption coefficient, absolute reflection coefficient, and other optical properties of insulators and semiconductors primarily in their fundamental region. Other chapters consider the interband transitions in the one-electron approximation. The final chapter deals with the equivalence of the transverse and longitudinal dielectric constants in the frequency range under consideration. This book is a valuable resource for solid state physicists. Readers and researchers with interest in the electron and optical properties of semiconductors and insulators will also find this book useful.

Electronic Structure and Optical Properties of PbY and SnY (Y Nilton Souza Dantas 2007

Optical Properties of Graphene Rolf Binder 2016-11-11 This book provides a comprehensive state-of-the-art overview of the optical properties of graphene. During the past decade, graphene, the most ideal and thinnest of all two-dimensional materials, has become one of the most widely studied materials. Its unique properties hold great promise to revolutionize many electronic, optical and opto-electronic devices. The book contains an introductory tutorial and 13 chapters written by experts in areas ranging from fundamental quantum mechanical properties to opto-electronic device applications of graphene.

Electronic Structure and Optical Properties of Lanthanide and Actinide Complexes in the Solid State Diane Marie Moran 1993

Optical Properties and Electronic Structure of Solid Silicon ... Joseph Frederick Mullaney 1944

Electronic Structure and Optical Properties of C60, Nanotubes and Carbon Onions Daniel Östling 1996

Electronic Structure and Optical Properties of InGaAs and InAsP Semiconductor

Quantum Wires Johan Hammersberg 1998

The Electronic Structure and Optical Properties of GaAs Two-dimensional Electron Systems David Robert Richards 1990

Electronic Structure and Optical Properties of Si-Ge Superlattice Abdussalam Ebrahim Mansur 1997

Electronic Structure and Optical Properties of Semiconductor Nanostructures Milena De Giorgi 2001

Electronic Structure and Optical Properties of Ruthenium Dioxide (RuO[subscript 2]) Troy D. Williams 1998

Optical Properties and Electronic Structure of Amorphous Ge and Si J. Tauc 1968

Electronic Structure and Optical Properties of Pristine and Modified Diamondoids Lasse Landt 2010

Optical Properties and Electronic Structure of Non-d0 Perovskite Oxide Epitaxial Films and Heterostructures Mark Dominic Scafetta 2015 Perovskite oxide materials provide a chemically diverse pseudo cubic ABO3 platform that possesses a large number of technologically relevant physical properties. It is possible grow complex heterostructures in addition to the nearly infinite stable chemical combinations. With this vast possibility for tuning and combining properties, it is not unlikely that perovskite oxides could change the face of many electronic and energy devices. However, analysis of the optical properties of non-d0 perovskite oxides is quite lacking and thus the electronic structure and important device parameters of many systems are not well characterized. This thesis is focused on understanding the coupling between composition, electronic structure and optical absorption in complex oxides. Modeling the absorption with Tauc plots is the standard way to determine the band gap energy (EG), a critical parameter for high performance photovoltaics, and other optical devices. Accurately modeling the absorption in complex oxides has not previously been studied in depth, leading to significant uncertainty in the limited work that has been conducted. Additionally, most of the prior work on the optical properties of perovskite oxides has been conducted on relatively simple systems with no d-electrons in the valence band (d0). Using LaFeO3 (LFO) (d5) as a model system, the optical absorption has been calculated and used to determine the most appropriate Tauc model. The results were applied to epitaxial films of LFO to determine a more accurate experimental band gap energy. Building on this knowledge, the effects of epitaxial strain, cation vacancies, A- and B-site substitution, and oxygen vacancies, on the optical and structural properties of LaFeO3-related compounds were investigated, providing new insights for band gap engineering in perovskite oxides.

The Electronic Structure and Optical Properties of Some First Row Transition

Metal Oxyhalides Jerry P. Jasinski 1974

Systematic Study of the Electronic Structure and Optical Properties of Icosahedral Boron and Boron Compounds Dong Li 1997

Electronic Structure and Optical Properties of Layered Ternary Transition-metal Carbides and Nitrides Yuxiang Mo 2011 The electronic structure and optical properties of Ti3AC2 (A=Al, Si, Ge), Ti2AC (A=Al, Ga, In; Si, Ge, Sn; P, As; S), Ti2AlN, M2AlC (M=V, Nb, Cr) and Tan+1AlCn (n=1~4) have been studied using first-principles orthogonalized linear combination of atomic orbitals (OLCAO) method. These layered ternary transition-metal carbides and nitrides are also commonly referred to as "MAX phases". Trends were observed for the calculated density of states (DOS) at Fermi-level, with respect to elemental variations and number of M and X layers. A local minimum of DOS(Ef) was found for Ti3AlC2, Ti2InC and Cr2AlC, predicting relatively high intrinsic structural stability. While a local maximum or an incline was discovered for Ti3GeC2, Ti2GeC, Ti2SnC, Ti2PC, Nb2AlC, Ta2AlC, Ta4AlC3 and Ta5AlC4, indicating their lower intrinsic structural stability. Inter-band optical conductivities showed anisotropy, but not considerable. The reflectance and colors of the MAX phase compounds were also obtained.

Electronic Structure and Optical Properties of Semiconductors Marvin L. Cohen 2012-12-06

Optical Properties of Semiconductors G. Martinez 1992-11-30 It is widely recognized that an understanding of the optical pro perties of matter will give a great deal of important information re levant to the fundamental physical properties. This is especially true in semiconductor physics for which, due to the intrinsic low screening of these materials, the optical response is quite rich. Their spectra reflect indeed as well electronic as spin or phonon transitions. This is also in the semiconductor field that artificial structures have been recently developed, showing for the first time specific physical properties related to the low dimentionality of the electronic and vi bronic properties : with this respect the quantum and fractional quan tum Hall effects are among the most well known aspects. The associated reduced screening is also a clear manifestation of these aspects and as such favors new optical properties or at least significantly enhan ces some of them. For all these reasons, it appeared necessary to try to review in a global way what the optical investigation has brought today about the understanding of the physics of semiconductors. This volume collects the papers presented at the NATO Advanced study Inst i tut e on "Optical Properties of Semiconductors" held at the Ettore Majorana Centre, Erice, Sicily on March 9th to 20th, 1992. This school brought together 70 scientists active in research related to optical properties of semiconductors. There were 12 lecturers who pro vided the main contributions .

Colloidal PbSe/CdSe Heteronanocrystals. Atomic Configuration, Electronic Structure and Optical Properties D. Grodzinska 2012

Electronic Structure and Electro-optical Properties of Silicon 1991

Electronic Structure and Optical Properties of Heterogeneous Nanocrystals Sergio Ivan Carrillo Guerrero 2012 The main objective of this work is to give a description of the electronic structure and optical properties of semiconductor quantum dots (nanocrystals) containing heterojunctions, i.e. nano-junctions between two semiconductors. These nanostructures have interesting optical properties which are very promising for applications in photonics and photovoltaics. The theoretical description of the effects of the interface demands special attention. We start describing the calculations of the electronic structure of bulk semiconductors using semi-empirical tight-binding, and we show how to apply this technique to semiconductor quantum dots. We develop expressions to connect the discrete levels of energy in a quantum dot and the transitions in optical absorption spectra. The bulk tight-binding parameters are used for the calculation of the electronic structure of quantum dots of single compounds, analyzing the effect of the size variation of the quantum dots. The effectiveness of this method is demonstrated, in particular we obtain good values for the bandgap versus size compared to experiments. We apply this method to calculate the electronic structure of PbSe/CdSe core/shell quantum dots, after an analysis of the different types of interfaces that can appear in this system, and we discuss the issues related to the determination of the band offsets. The results of these calculations validate the assumption of the role of the shell as a potential barrier for the electron and the hole. The electronic structures are used in the last chapter to simulate the absorption spectra of PbSe, CdSe and PbSe/CdSe quantum dots. We give theoretical support to recent experiments in transient absorption spectroscopy, revealing groups of new transitions originated by photo-induced intraband absorption. Our calculations shed light on the nature of these optical transitions which can be of interest for applications in photonics.

Electronic Structure and Optical Properties of Semiconductor Heterostructures D. Birkedal 1991

The Electronic Structure and Optical Properties of Organic Mixed Valence Anion Radicals Charles Andrew Liberko 1992

Optical Properties and Electronic Structure of Metals and Alloys; Proceedings of the International Colloquium. Editor: F. Abelès

Electronic Structure and Optical Properties of ZnO Caihua Yan 1994

Investigation of Electronic Structure and Optical Properties of Organic Molecular Semiconductor Materials by X-ray Spectroscopies Nikolaos Peltekis 2009

Electronic Structure and Optical Properties of Self-assembled InAs Quantum Dots Weidong Yang 1999