Optical and Structural Characterization of Thin Films


Optical and Structural Characterization of Zinc Implanted Silica Under Various Thermal Treatments. Characterization of direct transitions and 3.8 eV from non-direct transitions. The films' electric properties and their dependence in the space-charge limited conductivity (SCLC) governed by an exponential trap distribution is to be found at higher voltages.

In this work, thin-film deposition of FePc particles nucleated and grown in gels was carried out in air by spin coating. After post-growth thermal annealing, blue-shift of PL peak energy was clearly observed. However, this PL blue-shift can be explained by two major effects: (i) the reorganization of N and (ii) the strain relaxation in the GaAsN layer. On the other hand, blue shifts of ~ 550 meV. On the other hand, blue shifts of ~ 550 meV. Our results show the potential for the fabrication of 1.3 um-wavelength GaAsN QW lasers on GaAs substrates.

QWs. After post-growth thermal annealing, blue-shift of PL peak energy was clearly observed. However, this PL blue-shift can be explained by two major effects: (i) the reorganization of N and (ii) the strain relaxation in the GaAsN layer. On the other hand, blue shifts of ~ 550 meV. Our results show the potential for the fabrication of 1.3 um-wavelength GaAsN QW lasers on GaAs substrates.

Optical and Structural Characterization of GaN Grown by MBE Using Indium as a Surfactant. In conclusion the structural and optical characterization of GaN:In epilayers have shown that only a small amount of In occupies interstitial positions in the crystal lattice concentrate on mosaic grain boundaries and have a tendency to form fluctuation. Based on PL results, it is evident that the band alignment of GaAsN/GaAs heterostructure is a type-I can be explained by two major effects: (i) the reorganization of N and (ii) the strain relaxation in the GaAsN layer. On the other hand, blue shifts of ~ 550 meV. Our results show the potential for the fabrication of 1.3 um-wavelength GaAsN QW lasers on GaAs substrates.


Optical and Structural Characterization of Thin Films

Read Free Optical And Structural Characterization Of Thin Films
Solar Energy Update

Optical and Structural Characterization of Amorphous Carbon Films

Polymer thin film technology has made tremendous advances in the last decade because of the wide range of their technological applications including coatings, adhesives, lithography, organic light emitting diodes, sensors such as electronic noses and organic photodiodes. These applications require polymers to meet diverse performance criteria that range from adhesives to electronic, optical and mechanical performance. For organic light emitting diodes, applications the electronic and optical properties of the polymer are important for thin film coatings and fabrication applications, structural stability, viscosity and other mechanical properties are critical. The present dissertation entitled “POLYMER FILM CHARACTERIZATION: Optical, Electrical and Structural Characterization of Li Doped PVC Polymer Electrode Films for Battery Application” contains five chapters with the following contents. Films of pure PVC and LiClO4 complexed PVC were prepared by solution cast technique, in various compositions. X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and SEM data were recorded on these films to confirm the composition of salt with the polymer. Conductivity as a function of concentration and temperature was studied and the results are expressed in terms of existing theories. Optical absorption spectra of these polymer electrolytes were recorded in the wavelength range 200-400 nm and the parameters like optical bandgap (both indirect and indirect) and band edge values were determined. To study the charge transport and cell discharge characteristics Wagner’s polarization technique was used.

Optical and Structural Characterization of GaAsN Thin Film and GaAsN/GaAs Multiquantum Well with High Nitrogen Concentration Growth by MOVPE

This thesis focuses on structural characterization and optical properties of GaAsN based semiconducting alloys. Two material systems are characterized: GaAsN-based III-V and III-VI alloys, which represent a possible pathway to augment the optical performance of elemental silicon as a solar cell absorber layer. A GaAsN-based III-V alloy is a promising material for next generation solar cell technologies, which is mainly due to its direct band gap and excellent electron transport properties. Our research uses the X-ray photoelectron spectroscopy reveals the increase in the Fermi level of these films with increased nitrogen content. A series of III-V and III-VI alloys have been synthesized by the reaction of M(SiH3)3 (M = P, As) with Ar ions from a Braunshcuff cell. In the ALSPEC system, ellipsometry, confocal microscopy and electrical measurements are characterized by measuring the transmission electron microscopy (TEM) and correlated with bulk optical behavior.

Parametric Study of Chemical Bath Deposition and Optical and Structural Characterization of Patterned CdTe Thin Films

Zn-implanted silica with controlled thermal annealing was investigated. Low temperature optical measurements indicate presence of Zn cluster in as-implanted silica. Optical spectra of the annealed sample under a reducing environment suggest Zn and metal-cooled formation. The absorption peak at 5.3 eV may be due to surface plasma absorption of Zn metal colloids in silica. Oxodoped samples (10 and 1600 ion/cm2) show an absorption peak at 4.5 and 4.8 eV, respectively, and imply Zn quantum dot formation. The Zn cluster in silica absorption can be attributed to quantum confinement effects.

Structural Characterization of DNA-protein Complexes by Optically Detected Magnetic Resonance and Nuclear Magnetic Resonance

Synthesis, Structural Characterization and Non-linear Optical Properties of Side-chain Liquid Crystalline Polymers

Optical and Structural Characterization of Natural Nan structures

This work assess a broad range of optical spectroscopies and electron microscopy to characterize the structure and electronic states of nanowires. We place an emphasis on understanding how to alter the electronic properties using strain and quantum confinement. We seek to develop a comprehensive understanding of NW properties through comparisons with model predictions. CD techniques and optical spectroscopies traditionally used with larger structures to obtain a sub-ensemble measurement of nanowire diffusion and mobility. First, we extend our optical methods by spatially resolving the diffusion of excitons along the long axis of a nanowire using a solid immersion lens (SIL). By sampling the time decay as a function of distance along the nanowire, we can measure the diffusion of excitons directly. The extracted diffusion constants for defect free single crystal GaAs were measured between 45-100 cm²/s with resultant mobilities of 10000-100000 cm²/V·s. In contrast, a mixed phase InP nanowire shows a much shorter spatial diffusion limited by defect states with measured diffusion constants of <20 cm²/s. To study the effect of surface on a nanowire, we measured the photoluminescence response of single nanowires containing the same material. We observe a redshift of the bandgap with an increased amount of surface area. This redshift is attributed to a decrease in the quantum confinement effect.

Complete Structural Characterization of Foams Using 3D Images

Electrical Breakdown and Structural Characterization in Synthetic Resins Using Optical Techniques

Synthesis, Optical and Structural characterization, and Exciton Dynamics of Doped ZnSe Nanocrystals, And, Simultaneous X-ray Emission Spectroscopy of Two Elements Using Energy Dispersive Spectrometer

Polymer Film Characterization

The widespread use of lithium mohite (LN) in several technological applications, notably in optical and electrooptical systems, is a consequence of its remarkable photoelectric, electrophotonic, photoacoustic, and nonlinear optical coefficients. In this chapter, the structural and electrical characterization of LN nanosized particles synthesized by the Pechini route is discussed. Compared to solid-state reaction processes, wet-chemistry processes can be advantageous alternatives for the synthesis of polycrystalline LN, because they require lower processing temperatures, and thus the loss of stoichiometry and formation of secondary phases can be minimized. The powders obtained by drying the gel (base powder) were heat-treated for 4 h at temperatures between 400 and 1000°C, according to the differential thermal analysis (DTA) results. It was found that the powders treated at 650°C contain only the LN phase, while those heat-treated at 950°C already contain the secondary Li₃N-0.56G. The structural and electrical characterization of the samples treated at 450°C, for different times, was performed using X-ray diffraction (XRD) in conjunction with Rietveld refinement, Raman spectroscopy, scanning electron microscopy (SEM), and polarization microscopy. To study the electrical properties of these materials, dielectric measurements were performed using an LCR meter (Model 1252B) in the frequency range between 100 Hz and 1 MHz and by measuring the ac and dc conductivities.

Structural, Optical and Spectral Behaviour of InAs-based Quantum Dot Heterostructures

Japanese Journal of Applied Physics

A quantum dot molecular-based Terahertz emitter allows the engineering of intraband transitions and leads to reduced absorption losses. A background of the growth mechanisms for the dots, the background and application of quantum dot molecules (QDMs), optical and structural characterization methods employed in quantum dot research, and the theoretical advantages of III-V quantum dots are discussed in this thesis. A study of the structural and optical properties of In0.3 Ga0.7 AsQD/QDMs formed by two layers of self-assembled, vertically stacked quantum dots is presented. Structural parameters, as determined from transmission electron microscopy studies were used to calculate the strain. The calculated strain field was subsequently used to determine the electronic bandstructure. The theoretically calculated electronic bandstructures were found to be in good agreement with these experimentally measured by using the time-integrated photoelectron microscopy technique. In order to understand the QDM properties excitation and temperature dependent photoluminescence studies were conducted.

Characterization of Metals and Alloys

Optical and Structural Characterization of Confined and Strained Core/multi-shell Semiconductor Nanowires

Optical Surfaces Resistant to Severe Environments

A fundamental study of the correlations between ion energy, substrate temperature, and plasma density with hydrogen content, porosity, n2 bonding, optical gap, and refractive index of hydrogenated amorphous carbon (a-C) films is presented. A strong dependency between the ion energy used during deposition and the film's microstructure is shown. Moreover, it is revealed that the optical properties of the a-C films are controlled by the concentration and size of sp2 clusters in the film. Through N2 mixing in the source gas, room-temperature nitrogen doped polymeric-like a-C films were demonstrated for the first time. X-ray Photoelectron Spectroscopy revealed an increase in the Fermi level of these films with increased nitrogen content. A proof-of-concept a-C-based transparent heat mirror (THM) was demonstrated. It was shown that a-C acts as an oxygen-free protective barrier and anti-reflective coating for Ag films in the THM, increasing the transmission in the visible region by 10-20%.

Page 2/3
Structural and Optical Studies of Indium Gallium Arsenide/gallium Arsenide Quantum Dot Molecules for Terahertz Applications

The research described in this dissertation has involved the use of transmission electron microscopy (TEM) to characterize the structural properties of III-V and III-VI compound semiconductor heterostructures and superlattices. The microstructure of thick ZrTe$_2$ epilayers (~2-4 nm) grown by molecular beam epitaxy (MBE) under virtually identical conditions on GaSb, InAs, InP, and ZnTe substrates was compared using TEM. High resolution electron micrographs revealed a highly coherent interface for the ZrTe$_2$/GaSb sample, and showed coherency with well-separated structural unit cells for the ZrTe$_2$/InAs sample. Lomer edge dislocations and otho dislocations were commonly observed at the interfaces of the ZrTe$_2$/GaSb and ZrTe$_2$/InAs samples. The amount of residual strain in the interfaces was estimated to be 0.6% for the ZrTe$_2$/GaSb sample and 0.8% for the ZrTe$_2$/InAs sample. Strong PL spectra for all ZrTe$_2$ samples were observed from 80 to 100 K. High-quality Ga$_x$Bi$_{1-x}$/ZnTe/GaSb (001) virtual substrates with a temperature ramp at the beginning of the Ga$_x$Bi$_{1-x}$ growth has been demonstrated. High-resolution X-ray diffraction (XRD) showed clear (001) growth fringes from both Ga$_x$Bi$_{1-x}$/ZnTe and ZrTe$_2$/GaSb epilayers. Cross-sectional TEM images showed excellent crystal quality and smooth morphology for both ZrTe$_2$/GaSb and Ga$_x$Bi$_{1-x}$/ZnTe interfaces. Plan-view TEM images revealed the presence of Lomer dislocations at the interfaces and threading dislocations in the top GaSb layer. The density was estimated to be ~1 x 10$^{10}$/cm$^2$. The PL spectra showed improved optical properties when using the Ga$_x$Bi$_{1-x}$ transition layer grown on ZrTe$_2$ with a temperature ramp. The structural properties of strain-balanced InAs/GaSb SLs grown on Ga($x$)Bi$_{1-x}$/ZnTe substrates by molecular-beam epitaxy were deposition (MBE) and molecular-beam epitaxy (MBE) have been demonstrated. Optically-pumped optoelectronic structure (optical pumping) for large Ga$_x$Bi$_{1-x}$/ZnTe target have been investigated. Splinter deposition has the advantage of being easy to scale up for deposition on large surfaces. It is also possible to deposit at lower temperatures which allows the use of substrates with lower decomposition temperature. In the second edition of this thesis, optical and structural properties of grown GaN NRs have been studied.

Structural Characterization and Linear and Nonlinear Optical Properties of Polymer Materials

This book covers various aspects of characterization of materials in the areas of metals, alloys, steels, bonding, nanomaterials, polycrystalline, and surface coatings. These materials are obtained by different methods and techniques for example, x-ray diffraction, thermal analysis, and material science among others. Of these materials are classified according to application such as materials for medical applications, materials for industrial applications, materials used in the oil and gas industry used for coatings. The authors provide a comprehensive overview of structural characterization techniques including scanning electron microscopy (SEM), X-ray diffraction (XRD), transmission electron microscopy (TEM), Raman spectoscopy, image analysis, finite element methods (FEM), optical microscopy (OM), energy dispersive spectroscopy (EDS), Fourier transform infrared spectoscopy (FTIR), differential thermal analysis (DTA), differential scanning calorimetry (DSC), ultraviolet-visible spectroscopy (UV-Vis), infrared phase measurements (IPR), electrochemical impedance spectoscopy (EIS), thermogravimetry analysis (TGA), thermoluminescence (TL), photoluminescence (PL), high resolution transmission electron microscopy (HRTEM), and radio frequency (RF). The book includes theoretical models and illustrations of characterization properties—both structural and chemical.

Materials for Optoelectronic Devices, OEICs and Photonics

The aim of the contributions in this volume is to give a current overview on the basic properties and applications of semiconductor and nonlinear optical materials for optoelectronics and integrated optics. They provide a cross-link between different materials (III-V, III-VI, Si-C, glasses, etc.), various sample dimensions (from bulk crystals to quantum dots), and a range of techniques for growth (LPE to MO through) and for processing (from surface passivation to ion beams). Major growth techniques and materials are discussed, including the sophisticated technologies required to exploit the exciting properties of low-dimensional semiconductors. These proceedings will prove an invaluable guide to the current state of optoelectronic and nonlinear optical materials development, as well as indicating trends and also future markets for optoelectronic devices.

Magnetization Distribution at the Surface of Co-Cr Films

Tunable Transition-metal-linked Prussian Type Polyoxometalate Frameworks

The aim of the project is to accommodate and enhance the behavior of the framework and the metal oxide excitation and the structural, optical and electrical characterization of III-V semiconductor nanowires and III-VI semiconductor nanowires. Significant progress has been made on the theoretical analysis and fabrication process of the project. The theory has used both analytical and finite difference algorithms and has shown that the method of fabricating the nanowire is capable of producing the necessary small diameters of the nanostructures. CeFe$_2$O$_4$ nanowires and CeFe$_2$O$_4$-CeFe$_2$O$_4$ are shown to be possible and will be able to detect near-infrared laser wavelengths. The electron subband states and the absorption in the IR spectral range due to intersubband transitions has been calculated. The surface optical and longitudinal optical phonon modes have been calculated and the proper quantization procedure has been developed. Electron-phonon scattering has been investigated and high temperature operation has been investigated. The development of the nanowires has been completed and film films of III-V semiconductor nanowires has started and some optical and structural characterization has been performed.

Optical and Structural Characterization of GaN Based Hybrid Structures and Nanorods

This book explores the effects of growth phase or ripening time on the properties of quantum dot (QDs). It covers the effects of post-growth rapid thermal annealing (RTA) treatment on properties of single layer QDs. The effects of post-growth rapid thermal annealing (RTA) treatment on properties of single layer QDs are discussed. The book offers insight into InAs/GaSb thin films and the GaSb/GaAs heterostructures. These techniques make InAs/GaSb heterostructures a better choice over the single layer and uncoated multilayer QD heterostructure. Finally, the book discusses the monolayer (ML) growth technique to grow QDs. This recent technique has been proven to improve the device performance significantly. The contents of this monograph will prove useful to researchers and professionals alike.