Organic Electronic Materials Conjugated Polymers And Low Molecular Weight Organic Solids Springer Series In Materials Science

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Tg and Cracking in Conjugated Polymers - Mohammad Alkhadra's MS Defense - UCSD [inc vol] *Organic Electronic Materials Conjugated Polymers*

Studies on the electronic properties of conjugated polymers and low molecular weight organic solids have been of increasing interest in recent years. This book is organized into two parts dedicated to these two classes of materials.

Organic Electronic Materials - Conjugated Polymers and Low ...

Buy Organic Electronic Materials: Conjugated Polymers and Low Molecular Weight Organic Solids (Springer Series in Materials Science) 2001 by R. Farchioni, G. Grosso (ISBN: 9783540667216) from Amazon's Book Store. Everyday low prices and free delivery on eligible orders.

Organic Electronic Materials: Conjugated Polymers and Low ...

Abstract. A major attraction of organic conjugated semiconductors is that materials with new, emergent functionality can be designed and made by simple blending, as is extensively used in, e.g., bulk heterojunction organic solar cells. Herein doped blends based on organic semiconductors (OSCs) for thermoelectric applications are critically reviewed.

Conjugated Polymer Blends for Organic Thermoelectrics ...

The researchers reasoned that a coating could help. "We started looking at organic electronic materials like conjugated polymers that were being used in non-biological devices," says Martin, who is...

'Cyborg' technology could enable new diagnostics, merger ...

Conjugated polythiophene based materials have gained significant interest for organic electronic applications owing to their excellent optical and electrical properties, and their stability in the doped state. The potential use of these polymers has recently created enormous interest in other group 16 element based

Recent advances in poly(3,4-ethylenedioxyselenophene) and ...

These materials are the most popular ethylenedioxythiophene derivatives as well as conjugated polyelectrolytes and ion-free organic semiconductors functionalized for the biological interface. We then discuss several applications and operation principles of state-of-the-art bioelectronics devices.

Conjugated Polymers in Bioelectronics.

Organic electronics is a field of materials science concerning the design, synthesis, characterization, and application of organic molecules or polymers that show desirable electronic properties such as conductivity. Unlike conventional inorganic conductors and semiconductors, organic electronic materials are constructed from organic molecules or polymers using synthetic strategies developed in the context of organic chemistry and polymer chemistry. One of the promised benefits of organic electr

Organic electronics - Wikipedia

Photocatalytic heterogeneous organic transformation is considered as an efficient, clean atomic economy, and low-energy consumption strategy for organic synthesis. Conjugated polymers (CPs)-based materials have recently shown great potential for diverse photocatalytic applications because of their unique properties, such as structural designability, recyclability, high chemical stability, and low cost, and

they have emerged as promising alternatives to traditional molecular or inorganic ...

Heterogeneous Photocatalytic Organic Transformation ...

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As outlined in Fig. 1, important structural developments in the field of conjugated polymers include the improvement of polymerization conditions to prepare polymers with high structural fidelity, e.g. regioregular P3HT and donor-acceptor copolymers (PM6), the tuning of electronic and physical properties through the addition heteroatoms along the π-conjugated backbone, such as fluorine, the ...

The development of conjugated polymers as the cornerstone ...

Linear (one dimensional, 1D) conjugated polymers, such as poly(p-phenylene), poly(p-phenylene vinylene), poly(acetylene), polypyrrole, polythiophene and polyaniline, possess continuous π-electron delocalization along the chain axis and have received broad academic and industrial interest. 1–8 These conjugated polymers have exhibited many exciting properties, such as intrinsic optical and electronic activities, versatile doping/dedoping chemistry, flexibility, solution processability ...

Two-dimensional conjugated polymer films via liquid ...

Sep 13, 2020 organic electronic materials conjugated polymers and low molecular weight organic solids springer series in materials science Posted By Beatrix PotterPublic Library TEXT ID 0125c5c3d Online PDF Ebook Epub Library Conjugated Polymers In Bioelectronics

20 Best Book Organic Electronic Materials Conjugated ...

Conjugated polymer gels are promising materials that are intrinsically stretchable and conductive, which may play an important role in the development of stretchable electronics. In this work, a series of thiophene and selenophene-based conjugated polymers with similar molecular weight and low dispersity were synthesized and the gelation conditions of these polymers were studied. The ...

Selenophene and Thiophene-Based Conjugated Polymer Gels ...

Two-Dimensional Conjugated Polymeric Nanocrystals for Organic Electronics ¦ ACS Applied Electronic Materials. Two-dimensional (2D) materials have attracted greatest attention in the past years. In this study, we report 2D conjugated polymeric nanocrystals, polyhedral oligomeric silsesquioxanes (POSS) covalently bonded with main chain of poly(3-hexylthiophene) (P3HT) without utilization of a template or an exfoliation protocol.

Two-Dimensional Conjugated Polymeric Nanocrystals for ...

Studies on the electronic properties of conjugated polymers and low molecular weight organic solids have been of increasing interest in recent years. This book is organized into two parts dedicated to these two classes of materials.

Organic Electronic Materials: Conjugated Polymers and Low ...

ISBN: 3540667210 9783540667216 9783642630859 3642630855: OCLC Number: 45487561: Description: xviii, 448 pages : illustrations ; 25 cm. Contents: Introduction to electronic polymers : influence of nanostructure on electronic phenomena / A.J. Epstein --Theoretical studies of electronic properties of conjugated polymers / M. Springborg [and others] --Recursive algorithms for polymeric chains / R ...

Organic electronic materials : conjugated polymers and low ...

Surface Catalytic Modification of Conjugated Polymer on Low‐Cost Bottom Contact for Improved Injection Efficiency of Organic Transistors Xiaosong Chen International Collaborative Laboratory of 2D Materials for Optoelectronics Science and Technology of Ministry of Education, Shenzhen University, Shenzhen, 518060 China

This book brings together selected contributions both on the fundamental information on the physics and chemistry of these materials, new physical ideas and decisive experiments. It constitutes both an insightful treatise and a handy reference for specialists and graduate students working in solid state physics and chemistry, material science and related fields.

Hybrid organic-inorganic materials and the rational design of their interfaces open up the access to a wide spectrum of functionalities not achievable with traditional concepts of materials science. This innovative class of materials has a major impact in many application domains such as optics, electronics, mechanics, energy storage, and conversion, protective coatings, catalysis, sensing, and nanomedicine. The properties of these materials do not only depend on the chemical structure, and the mutual interaction between their nano-scale building blocks, but are also strongly influenced by the interfaces they share. This handbook focuses on the most recent investigations concerning the design, control, and dynamics of hybrid organic-inorganic interfaces, covering: (i) characterization methods of interfaces, (ii) innovative computational approaches and simulation of interaction processes, (iii) in-situ studies of dynamic aspects controlling the formation of these interfaces, and (iv) the role of the interface for process optimization, devices, and applications in such areas as optics,

electronics, energy, and medicine.

Conjugated polymers, representing a new generation of semiconductors, have attracted tremendous attention in the past few decades attributed to their conspicuous properties, such as flexibility, light weight, stretchability and solution processability, which is promising for manufacturing low-cost, large-area, and flexible electronic devices. Moreover, performance of semiconducting behaviors could be readily modulated via manipulating chemical structure and morphology. Organic field-effect transistors (OFETs) are the elemental components in electrical circuits. Although considerable materials were synthesized and investigated, there are still numerous approaches either in novel materials or morphological control which have not been explored. Therefore, in this research, five different strategies were proposed to attain conjugated polymer-based higher performance materials for OFETs, including novel pigment monomers, polymerization method and morphological manipulation by hydrogen bonding and conjugated cross-linking. In Part I, a blue/violet pigment, benzimidazolone-dioxazine-based molecule, was employed into donor−acceptor based conjugated polymers. Through the molecular modulation, the donors with matched size for donor-acceptor packing in the conjugated polymer thin films were uncovered, revealing refined charge carrier mobilities owing to the extended conjugated length of benzimidazolone-dioxazine structure. Part II discloses the diketopyrrolopyrrole(DPP)-quaterthiophene-based donor-acceptor copolymers with latent hydrogen bonding isoindigo-bithiophene to amend the charge transport in amorphous phase via hydrogen bonding-induced aggregation after thermal treatment. Part III applied the robust hydrogen bonding interaction to directly patterning conjugated polymer thin films and their OFETs with exceptional balance of mobilities and resolution of patterns, which is compatible with conventional photolithography in integrated circuit. Part IV introduces a newfangled method to obtain conjugated polymers with controlled molecular weight in the solid state, consisting of conventional anionic-polymerization and topochemical reaction. Moreover, this strategy could be further utilized to prepare the high-performance semiconducting material, graphene nanoribbons. Part V coalesced the concepts of Part II and IV to construct conjugated cross-linking between polymer backbones through topochemical reactions on diketopyrrolopyrrole(DPP)-quaterthiophene-based copolymers with latent cross-linkable diacetylene-bithiophene moieties, ameliorating the charge transport without demolishing the favorable packing of donor-acceptor conjugated polymers.

The field of organic electronics promises exciting new technologies based on inexpensive and mechanically flexible electronic devices, and is now seeing the beginning of commercial success. On the sidelines of this increasingly well-established field are several emerging technologies with innovative mechanisms and functions that utilize the mixed ionic/electronic conducting character of conjugated organic materials. Iontronics: Ionic Carriers in Organic Electronic Materials and Devices explores the potential of these materials, which can endow electronic devices with unique functionalities. Fundamental science and applications With contributions from a community of experts, the book focuses on the use of ionic functions to define the principle of operation in polymer devices. It begins by reviewing the scientific understanding and important scientific discoveries in the electrochemistry of conjugated polymers. It examines the known effects of ion incorporation, including the theory and modulation of electrochemistry in polymer films, and it explores the coupling of electronic and ionic transport in polymer films. The authors also describe applications that use this technology, including polymer electrochromic devices, artificial muscles, light-emitting electrochemical cells, and biosensors, and they discuss the fundamental

technological hurdles in these areas. The changes in materials properties and device characteristics due to ionic conductivity and electrochemical doping in electrically conductive organic materials, as well as the importance of these processes in a number of different and exciting technologies, point to a large untapped potential in the development of new applications and novel device architecture. This volume captures the state of the science in this burgeoning field.

Understanding structure-property relationships of [pi]-conjugated polymers is key to the development of functional materials for organic electronics. Molecular structure and polymer chain order strongly influence the electrical and mechanical performance of materials. First described is the theoretical and experimental quantification of polaron sizes in polythiophene polymers. Intramolecular and intermolecular charge delocalization length were studied to elucidate prior research relating polymer structure and packing morphology to electrical performance. Polythiophenes were also studied through the analysis of previously reported molecular dynamic simulations. Comparison of these models to experimental neutron scattering experiments revealed the requirement for updated parameters to accurately simulate polymer behavior. Polythiophenes are further described for the development of stretchable electronic materials. Improved compatibility in an elastomer/[pi]-conjugated polymer composite was achieved by the introduction of bromide functional groups. Functionalization led to altered intermolecular interactions and reactive covalent bonding which enhanced mechanical performance.

This book provides a detailed introduction to organic radical polymers and open-shell macromolecules. Functional macromolecules have led to marked increases in a wide range of technologies, and one of the fastest growing of these fields is that of organic electronic materials and devices. To date, synthetic and organic electronic device efforts have focused almost exclusively on closed-shell polymers despite the promise of open-shell macromolecules in myriad applications. This text represents the first comprehensive review of the design, synthesis, characterization, and device applications of open-shell polymers. In particular, it will summarize the impressive synthetic and device performance efforts that have been achieved with respect to energy storage, energy conversion, magnetic, and spintronic applications. By combining comprehensive reviews with a wealth of informative figures, the text provides the reader with a complete “ molecules-to-modules ” understanding of the state of the art in open-shell macromolecules. Moreover, the monograph highlights future directions for open-shell polymers in order to allow the reader to be part of the community that continues to build the field. In this way, the reader will gain a rapid understanding of the field and will have a clear pathway to utilize these materials in next-generation applications.

Provides first-hand insights into advanced fabrication techniques for solution processable organic electronics materials and devices The field of printable organic electronics has emerged as a technology which plays a major role in materials science research and development. Printable organic electronics soon compete with, and for specific applications can even outpace, conventional semiconductor devices in terms of performance, cost, and versatility. Printing techniques allow for large-scale fabrication of organic electronic components and functional devices for use as wearable electronics, health-care sensors, Internet of Things, monitoring of environment pollution and many others, yet-to-be-conceived applications. The first part of Solution-Processable Components for Organic

Electronic Devices covers the synthesis of: soluble conjugated polymers; solution-processable nanoparticles of inorganic semiconductors; high-k nanoparticles by means of controlled radical polymerization; advanced blending techniques yielding novel materials with extraordinary properties. The book also discusses photogeneration of charge carriers in nanostructured bulk heterojunctions and charge carrier transport in multicomponent materials such as composites and nanocomposites as well as photovoltaic devices modelling. The second part of the book is devoted to organic electronic devices, such as field effect transistors, light emitting diodes, photovoltaics, photodiodes and electronic memory devices which can be produced by solution-based methods, including printing and roll-to-roll manufacturing. The book provides in-depth knowledge for experienced researchers and for those entering the field. It comprises 12 chapters focused on: ? novel organic electronics components synthesis and solution-based processing techniques ? advanced analysis of mechanisms governing charge carrier generation and transport in organic semiconductors and devices ? fabrication techniques and characterization methods of organic electronic devices Providing coverage of the state of the art of organic electronics, Solution-Processable Components for Organic Electronic Devices is an excellent book for materials scientists, applied physicists, engineering scientists, and those working in the electronics industry.

This book covers the combined subjects of organic electronic and optoelectronic materials/devices. It is designed for classroom instruction at the senior college level. Highlighting emerging organic and polymeric optoelectronic materials and devices, it presents the fundamentals, principle mechanisms, representative examples, and key data.

Conjugated polymers and small molecules are gaining a growing attention as the active materials for flexible and printed electronics. The present work discusses the exploration of novel conjugated polymers and small molecules with latent hydrogen-bonding on the conjugated backbone for electronic applications. In the first study, we synthesized a class of conjugated polymers with latent hydrogen-bonding utilizing Suzuki coupling reactions. The resulting polymers can be converted into actual hydrogen-bonded polymers upon thermal or UV removal of the t-butoxyl carbonyl (t-Boc) protection groups on the main chains. Large bathochromic absorption shift and dramatically decreased material solubility of the polymer were shown after the formation of hydrogen-bonding, indicating their enhanced interchain interactions. Photolithographic patterned electrochromic devices was fabricated and tested with the latent hydrogen-bonded conjugated polymers. The second study extends in assessing the field-effect transistor performance of two diketopyrrolopyrrole-based conjugated small molecules with latent hydrogen-bonding. Effects of the activation of latent hydrogen-bonding networks on the small molecule film properties, including UV/Vis absorption, band gap, solvent resistance, film morphology, molecular packing mode, and charge mobility are investigated. Highly crystalline films and improved field-effect mobility of the device was observed for both small molecules after the hydrogen-bonding activation, suggesting an efficient control of molecular organization and device performance of the latent hydrogen-bonding strategy. Based on similar principles, a series of conjugated statistical copolymers with varied latent hydrogen-bonding content on the main chain were studied in the third part of this work. Increased hole mobility was observed for the organic field-effect transistor devices of polymers in which higher percentage of hydrogen-bonded repeating units were comprised, which suggested the potential of latent hydrogen-bonding strategy in constructing solution-processed conjugated polymers with improved semiconducting performance.

Conjugated polymers comprise some of the most promising materials for new technologies such as organic field effect transistors, solar light harvesting technology and sensing devices. In spite of tremendous research initiatives in materials chemistry, the potential to optimize device performance and develop new technologies is remarkable. Understanding relationships between the structure of conjugated polymers and their electronic properties is critical to improving device performance. The design and synthesis of new materials which self-organize into ordered nanostructures creates opportunities to establish relationships between electronic properties and morphology or molecular packing. This thesis details our progress in the development of synthetic routes which provide access to new classes of conjugated polymers that contain dissimilar side chains that segregate or dissimilar conjugated blocks which phase separate, and summarizes our initial attempts to characterize these materials. Poly(1,4-phenylene ethynylene)s (PPEs) have been used in a variety of organic electronic applications, most notably as fluorescent sensors. Using traditional synthetic methods, asymmetrically disubstituted PPEs have irregular placement of side chains on the conjugated backbone. Herein, we establish the first synthetic route to an asymmetrically substituted regioregular PPEs. The initial PPEs in this study have different lengths of alkoxy side chains, and both regioregular and regiorandom analogs are synthesized and characterized for comparison. The design of amphiphilic structures provides additional opportunities for side chains to influence the molecular packing and electronic properties of conjugated polymers. A new class of regioregular, amphiphilic PPEs has been prepared bearing alkoxy and semifluoroalkoxy side chains, which have a tendency to phase separate. Fully conjugated block copolymers can provide access to interesting new morphologies as a result of phase separation of the conjugated blocks. In particular, donor-acceptor block copolymers that phase separate into electron rich and electron poor domains may be advantageous in organic electronic devices such as bulk heterojunction solar cells, of which the performance relies on precise control of the interface between electron donating and accepting materials. The availability of donor-acceptor block copolymers is limited, largely due to the challenges associated with synthesizing these materials. In this thesis, two new synthetic routes to donor-acceptor block copolymers are established. These methods both utilize the catalyst transfer condensation polymerization, which proceeds by a chain growth mechanism. The first example entails the synthesis of a monofunctionalized, telechelic poly(3-alkylthiophene) which can be coupled to electron accepting polymers in a subsequent reaction. The other method describes the first example of a one-pot synthesis of a donor-acceptor diblock copolymer. The methods of synthesis are described, and characterization of the block copolymers is reported.