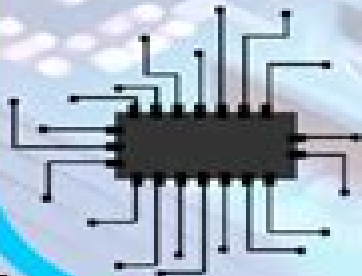


# Organic field effect transistors

- Organic Field-Effect Transistors (OFETs) use organic semiconductor materials to control current flow
- They are flexible, lightweight, and can be produced at lower costs compared to traditional silicon-based transistors
- OFETs are pivotal in developing flexible electronic devices like bendable displays and wearable sensors
- Their performance is influenced by the purity and molecular arrangement of the organic materials used

## Practical example: Electronics

- Organic Field-Effect Transistors (OFETs) are a type of transistor used in electronics that utilize organic semiconductor materials
- Unlike traditional transistors made from silicon, OFETs can be produced more cheaply and flexibly
- They are found in applications like flexible displays, lighting, and sensors
- Their lightweight and bendable properties make them ideal for wearable technology and foldable electronic devices



# Organic Field Effect Transistors Optical Science And Engineering

**Daniel J. Gaspar, Evgueni Polikarpov**



## **Organic Field Effect Transistors Optical Science And Engineering:**

*Organic Field-Effect Transistors* Zhenan Bao, Jason Locklin, 2018-10-03 The remarkable development of organic thin film transistors OTFTs has led to their emerging use in active matrix flat panel displays radio frequency identification cards and sensors Exploring one class of OTFTs Organic Field Effect Transistors provides a comprehensive multidisciplinary survey of the present theory charge transport studies synthetic methodology materials characterization and current applications of organic field effect transistors OFETs Covering various aspects of OFETs the book begins with a theoretical description of charge transport in organic semiconductors at the molecular level It then discusses the current understanding of charge transport in single crystal devices small molecules and oligomers conjugated polymer devices and charge injection issues in organic transistors After describing the design rationales and synthetic methodologies used for organic semiconductors and dielectric materials the book provides an overview of a variety of characterization techniques used to probe interfacial ordering microstructure molecular packing and orientation crucial to device performance It also describes the different processing techniques for molecules deposited by vacuum and solution followed by current technological examples that employ OTFTs in their operation Featuring respected contributors from around the world this thorough up to date volume presents both the theory behind OFETs and the latest applications of this promising technology [Organic Field-Effect Transistors](#) Zhenan Bao, Jason Locklin, 2018-10-03 The remarkable development of organic thin film transistors OTFTs has led to their emerging use in active matrix flat panel displays radio frequency identification cards and sensors Exploring one class of OTFTs Organic Field Effect Transistors provides a comprehensive multidisciplinary survey of the present theory charge transport studies synthetic methodology materials characterization and current applications of organic field effect transistors OFETs Covering various aspects of OFETs the book begins with a theoretical description of charge transport in organic semiconductors at the molecular level It then discusses the current understanding of charge transport in single crystal devices small molecules and oligomers conjugated polymer devices and charge injection issues in organic transistors After describing the design rationales and synthetic methodologies used for organic semiconductors and dielectric materials the book provides an overview of a variety of characterization techniques used to probe interfacial ordering microstructure molecular packing and orientation crucial to device performance It also describes the different processing techniques for molecules deposited by vacuum and solution followed by current technological examples that employ OTFTs in their operation Featuring respected contributors from around the world this thorough up to date volume presents both the theory behind OFETs and the latest applications of this promising technology **Interface Engineering in Organic Field-Effect Transistors** Xuefeng Guo, Hongliang Chen, 2023-07-05 Interface Engineering in Organic Field Effect Transistors Systematic summary of advances in developing effective methodologies of interface engineering in organic field effect transistors from models to experimental techniques Interface Engineering in Organic Field Effect Transistors covers the state of the art in

organic field effect transistors and reviews charge transport at the interfaces device design concepts and device fabrication processes and gives an outlook on the development of future optoelectronic devices This book starts with an overview of the commonly adopted methods to obtain various semiconductor semiconductor interfaces and charge transport mechanisms at these heterogeneous interfaces Then it covers the modification at the semiconductor electrode interfaces through which to tune the work function of electrodes as well as reveal charge injection mechanisms at the interfaces Charge transport physics at the semiconductor dielectric interface is discussed in detail The book describes the remarkable effect of SAM modification on the semiconductor film morphology and thus the electrical performance In particular valuable analyses of charge trapping detrapping engineering at the interface to realize new functions are summarized Finally the sensing mechanisms that occur at the semiconductor environment interfaces of OFETs and the unique detection methods capable of interfacing organic electronics with biology are discussed Specific sample topics covered in Interface Engineering in Organic Field Effect Transistors include Noncovalent modification methods charge insertion layer at the electrode surface dielectric surface passivation methods and covalent modification methods Charge transport mechanism in bulk semiconductors influence of additives on materials nucleation and morphology solvent additives and nucleation agents Nanoconfinement effect enhancing the performance through semiconductor heterojunctions planar bilayer heterostructure ambipolar charge transfer complex and supramolecular arrangement of heterojunctions Dielectric effect in OFETs dielectric modification to tune semiconductor morphology surface energy control microstructure design solution shearing eliminating interfacial traps and SAM SiO<sub>2</sub> dielectrics A timely resource providing the latest developments in the field and emphasizing new insights for building reliable organic electronic devices Interface Engineering in Organic Field Effect Transistors is essential for researchers scientists and other interface related professionals in the fields of organic electronics nanoelectronics surface science solar cells and sensors

*Mechanics of Flexible and Stretchable Electronics* Yong Zhu,Nanshu Lu,2024-09-04

Discover a comprehensive overview and advances in mechanics to design the cutting edge electronics Soft electronics systems which include flexible and stretchable electronics are an area of technology with the potential to revolutionize fields from healthcare to defense Engineering for flexibility and stretchability without compromising electronic functions poses serious challenges and extensive mechanics and engineering knowledge is required to meet these challenges Mechanics of Flexible and Stretchable Electronics introduces a range of soft functional materials and soft structures and their potential applications in the construction of soft electronics systems Its detailed attention to the mechanics of these materials and structures makes it an indispensable tool for scientists and engineers at the cutting edge of electronics technology Mechanics of Flexible and Stretchable Electronics readers will also find A detailed summary of recent advances in the field Detailed treatment of structures including kirigami serpentine wrinkles and many more A multidisciplinary approach suited to a varied readership Mechanics of Flexible and Stretchable Electronics is ideal for electronics and mechanical engineers solid

state physicists and materials scientists as well as the libraries that support them      *Organic Field Effect Transistors*, 2005

**Electronic Processes in Organic Electronics** Hisao Ishii, Kazuhiro Kudo, Takashi Nakayama, Nobuo Ueno, 2015-01-07

The book covers a variety of studies of organic semiconductors from fundamental electronic states to device applications including theoretical studies Furthermore innovative experimental techniques e g ultrahigh sensitivity photoelectron spectroscopy photoelectron yield spectroscopy spin resolved scanning tunneling microscopy STM and a material processing method with optical vortex and polarization vortex lasers are introduced As this book is intended to serve as a textbook for a graduate level course or as reference material for researchers in organic electronics and nanoscience from electronic states fundamental science that is necessary to understand the research is described It does not duplicate the books already written on organic electronics but focuses mainly on electronic properties that arise from the nature of organic semiconductors molecular solids The new experimental methods introduced in this book are applicable to various materials e g metals inorganic and organic materials Thus the book is also useful for experts working in physics chemistry and related engineering and industrial fields      **Physics and Chemistry of Graphene (Second Edition)** Toshiaki Enoki, Tsuneya Ando, 2019-11-01

Graphene has been attracting growing attentions in physics chemistry and device applications after the discovery of micromechanically cleaved graphene sheet by A Geim and K Novoselov who were awarded the 2010 Nobel Prize in Physics The electronic structure of graphene which is described in terms of massless Dirac fermions brings about unconventional electronic properties which are not only an important basic issue in condensed matter physics but also a promising target of cutting edge electronics spintronics device applications Meanwhile from chemistry aspect graphene is the extreme of condensed polycyclic hydrocarbon molecules extrapolated to infinite size Here the concept on aromaticity which organic chemists utilize is applicable Interesting issues appearing between physics and chemistry are pronounced in nanosized graphene nanographene as we recognize the importance of the shape of nanographene in understanding its electronic structure This book comprehensively discusses the fundamental issues related to the electronic magnetic and chemical properties of condensed polycyclic hydrocarbon molecules nanographene and graphene      *Physics and Chemistry of Graphene* Toshiaki Enoki, Tsuneya Ando, 2013-01-24 From a chemistry aspect graphene is the extrapolated extreme of condensed polycyclic hydrocarbon molecules to infinite size Here the concept on aromaticity which organic chemists utilize is applicable Interesting issues appearing between physics and chemistry are pronounced in nano sized graphene nanographene as we recognize the importance of the shape of nanographene in understanding its electronic structure In this book the fundamental issues on the electronic magnetic and chemical properties of condensed polycyclic hydrocarbon molecules nanographene and graphene are comprehensively discussed      **Lightwave Engineering** Yasuo

Kokubun, 2018-09-03 Suitable as either a student text or professional reference Lightwave Engineering addresses the behavior of electromagnetic waves and the propagation of light which forms the basis of the wide ranging field of

optoelectronics Divided into two parts the book first gives a comprehensive introduction to lightwave engineering using plane wave and then offers an in depth analysis of lightwave propagation in terms of electromagnetic theory Using the language of mathematics to explain natural phenomena the book includes numerous illustrative figures that help readers develop an intuitive understanding of light propagation It also provides helpful equations and outlines their exact derivation and physical meaning enabling users to acquire an analytical understanding as well After explaining a concept the author includes several problems that are tailored to illustrate the explanation and help explain the next concept The book addresses key topics including fundamentals of interferometers and resonators guided wave optical fibers and lightwave devices and circuits It also features useful appendices that contain formulas for Fourier transform derivation of Green s theorem vector algebra Gaussian function cylindrical function and more Ranging from basic to more difficult the book s content is designed for easily adjustable application making it equally useful for university lectures or a review of basic theory for professional engineers

The Study of N-type Characteristics in Pentacene-based Organic Field-effect Transistors □□□,2011      ZnO Thin-Film Transistors for Cost-Efficient Flexible Electronics Fábio Fedrizzi Vidor,Gilson Inácio Wirth,Ulrich Hilleringmann,2017-12-28 This book describes the integration characterization and analysis of cost efficient thin film transistors TFTs applying zinc oxide as active semiconductors The authors discuss soluble gate dielectrics ZnO precursors and dispersions containing nanostructures of the material while different transistor configurations are analyzed with respect to their integration compatibility and device performance Additionally simple circuits inverters and ring oscillators and a complementary design employing in organic semiconducting materials are presented and discussed Readers will benefit from concise information on cost efficient materials and processes applied in flexible and transparent electronic technology such as the use of solution based materials and dispersion containing nanostructures as well as discussion of the physical fundamentals responsible for the operation of the thin film transistors and the non idealities of the device      **Smart CMOS Image Sensors and Applications** Jun Ohta,2020-05-12 Revised and expanded for this new edition Smart CMOS Image Sensors and Applications Second Edition is the only book available devoted to smart CMOS image sensors and applications The book describes the fundamentals of CMOS image sensors and optoelectronic device physics and introduces typical CMOS image sensor structures such as the active pixel sensor APS Also included are the functions and materials of smart CMOS image sensors and present examples of smart imaging Various applications of smart CMOS image sensors are also discussed Several appendices supply a range of information on constants illuminance MOSFET characteristics and optical resolution Expansion of smart materials smart imaging and applications including biotechnology and optical wireless communication are included Features Covers the fundamentals and applications including smart materials smart imaging and various applications Includes comprehensive references Discusses a wide variety of applications of smart CMOS image sensors including biotechnology and optical wireless communication Revised and expanded to include the state of the art of

smart image sensors      **Multi Frequency EPR Spectroscopy of Conjugated Polymers and Their Nanocomposites**

Victor I. Krinichnyi, 2016-10-14 Conjugated polymeric materials and their nanocomposites are widely used for the creation of alternative sources of renewable energy cell phone screens mobile gadgets video players and OLED TV as well as organic diodes transistors sensors etc with field dependent and spin assisted electronic properties Multifrequency EPR Spectroscopy methods can help researchers optimize their structural magnetic and electronic properties for the creation of more efficient molecular devices This book will acquaint the reader with the basic properties of conjugated polymers the fundamentals of EPR Spectroscopy and the information that can be obtained at different wavebands of EPR spectroscopy

Solution-Processable Components for Organic Electronic Devices Beata Luszczynska, Krzysztof Matyjaszewski, Jacek Ulanski, 2019-06-11 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      **Laser Safety** Ken Barat, 2017-12-19 New chapters and updates highlight the second edition of Laser Safety Tools and Training This text provides background information relating to lasers and laser safety and examines the components of laser work and laser safety from a different perspective Written by a working laser safety officer the book considers ways to keep users as well as

those around them safe The author encourages readers to think beyond protective eyewear As it relates to safety he determines that if eyewear is required then the laser system is not ideal This book factors in optics the vibration elements of the optical table the power meter and user training elements that are not commonly considered in the context of laser safety It presents ways for users to evaluate the hazards of any laser procedure and ensure that they are following documented laser safety standards The material serves as a fundamental means or road map for laser users seeking to utilize the safest system possible What's New in the Second Edition The second edition provides an inclusion of the Z136.8 Research Laser Standard and offers updates and an explanation of eye exposure limits MPE presents new case studies and presents practical example images It includes coverage of laser lab design lessons addresses user facility challenges and laser disposal Presents case studies of real accidents preventive measures and templates for documenting potential laser risks and attendant safety measures Reviews factors often overlooked when one is setting up a laser lab Demonstrates how to investigate a laser incident This text which includes fundamental laser and laser safety information as well as critical laser use information is appropriate for both the novice and the seasoned professional

**OLED Fundamentals** Daniel J. Gaspar, Evgueni Polikarpov, 2015-05-15 A Comprehensive Source for Taking on the Next Stage of OLED R DOLED Fundamentals Materials Devices and Processing of Organic Light Emitting Diodes brings together key topics across the field of organic light emitting diodes OLEDs from fundamental chemistry and physics to practical materials science and engineering aspects to design and manufacturing

**Organic Optoelectronics** Wenping Hu, Fenglian Bai, Xiong Gong, Xiaowei Zhan, Hongbing Fu, Thomas Bjornholm, 2012-11-05 Written by internationally recognized experts in the field with academic as well as industrial experience this book concisely yet systematically covers all aspects of the topic The monograph focuses on the optoelectronic behavior of organic solids and their application in new optoelectronic devices It covers organic field effect and organic electroluminescent materials and devices organic photonics materials and devices as well as organic solids in photo absorption and energy conversion Much emphasis is laid on the preparation of functional materials and the fabrication of devices from materials synthesis and purification to physicochemical properties and the basic processes and working principles of the devices The only book to cover fundamentals applications and the latest research results this is a handy reference for both researchers and those new to the field From the contents Electronic process in organic solids Organic polymeric semiconductors for field effect transistors Organic polymeric field effect transistors Organic circuits and organic single molecular transistors Polymer light emitting Diodes PLEDs devices and materials Organic solids for photonics Organic photonic devices Organic solar cells based on small molecules Polymer solar cells Dye sensitized solar cells DSSCs Organic thermoelectric power devices

**Handbook of Nanomaterials for Industrial Applications** Chaudhery Mustansar Hussain, 2018-07-19 Handbook of Nanomaterials for Industrial Applications explores the use of novel nanomaterials in the industrial arena The book covers nanomaterials and the techniques that can play vital roles in many industrial procedures



such as increasing sensitivity magnifying precision and improving production limits In addition the book stresses that these approaches tend to provide green sustainable solutions for industrial developments Finally the legal economical and toxicity aspects of nanomaterials are covered in detail making this is a comprehensive important resource for anyone wanting to learn more about how nanomaterials are changing the way we create products in modern industry Demonstrates how cutting edge developments in nanomaterials translate into real world innovations in a range of industry sectors Explores how using nanomaterials can help engineers to create innovative consumer products Discusses the legal economical and toxicity issues arising from the industrial applications of nanomaterials      Organic and Inorganic Materials Based Sensors, 3 Volumes

Sangita Das,Sabu Thomas,Partha Pratim Das,2023-12-22 Organic and Inorganic Materials Based Sensors A three volume comprehensive overview of the development and applications of various novel potent molecular sensor frameworks In Organic and Inorganic Materials Based Sensors 3 Volume Set a team of distinguished researchers delivers an interdisciplinary presentation of the engineering of high performance biopolymer based bio nanocomposites as well as strategies for the use of various molecules in the detection of environmentally important guest analytes This three volume book explores the most relevant technological developments in nanomaterials sensors and offers a broad and comprehensive overview of cutting edge research on advanced materials in the fast moving sensors industry The authors explain the science behind nanomaterials for environmental remediation as well as the components and ingredients of the relevant materials Readers will also find Thorough introductions to sensory devices polymer based nano biomaterials and opto electrochemical devices Comprehensive explorations of metal organic frameworks organic sensors and organic inorganic composite semiconductor sensors Practical discussions of vapochromic and vapoluminescent sensors Fulsome treatments of sensor ecosystems for health self monitoring including discussions of diabetes management Perfect for materials scientists mechanical engineers and analytical chemists Organic and Inorganic Materials Based Sensors will also benefit inorganic and organic chemists robotics engineers and professionals working in the sensor industry      *Thin-Film Transistors* Cherie R. Kagan,Paul Andry,2003-02-25 A single source treatment of developments in TFT production from international specialists It interweaves overlapping areas in multiple disciplines pertinent to transistor fabrication and explores the killer application of amorphous silicon transistors in active matrix liquid crystal displays

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