

# MOLECULAR ELECTRONIC DEVICES

- Monomolecular film devices(diodes, switches, memory).
- Single molecule FET
- Organic light emitting diode(OLED).

# Molecular Electronics And Molecular Electronic Devices

**Senthil Arun Rajagopal**



## **Molecular Electronics And Molecular Electronic Devices:**

*Molecular Electronics and Molecular Electronic Devices* Kristof Sienicki, 1994      *Molecular Electronics and Molecular Electronic Devices* Kristof Sienicki, 1994-03-22 *Molecular Electronics and Molecular Electronic Devices* is a new book series that reflects the state of the art in the science and technology of molecular electronic devices. It provides a comprehensive review of current problems and the latest information regarding all aspects of molecular electronics and molecular electronic devices. Experimental and theoretical aspects of molecular electronics and molecular electronic devices are reviewed by distinguished researchers working in chemistry, physics, computer science, and various areas of biology.      **Molecular-Scale Electronics** Xuefeng Guo, Dong Xiang, Yu Li, 2020-08-31 Provides in depth knowledge on molecular electronics and emphasizes the techniques for designing molecular junctions with controlled functionalities. This comprehensive book covers the major advances with the most general applicability in the field of molecular electronic devices. It emphasizes new insights into the development of efficient platform methodologies for building such reliable devices with desired functionalities through the combination of programmed bottom up self assembly and sophisticated top down device fabrication. It also helps to develop an understanding of the device fabrication processes and the characteristics of the resulting electrode molecule interface. Beginning with an introduction to the subject, *Molecular Scale Electronics: Concept, Fabrication, and Applications* offers full chapter coverage on topics such as Metal Electrodes for Molecular Electronics, Carbon Electrodes for Molecular Electronics, Other Electrodes for Molecular Electronics, Novel Phenomena in Single Molecule Junctions, and Supramolecular Interactions in Single Molecule Junctions. Other chapters discuss Theoretical Aspects for Electron Transport through Molecular Junctions, Characterization Techniques for Molecular Electronics, and Integrating Molecular Functionalities into Electrical Circuits. The book finishes with a summary of the primary challenges facing the field and offers an outlook at its future. Summarizes a number of different approaches for forming molecular scale junctions and discusses various experimental techniques for examining these nanoscale circuits in detail. Gives overview of characterization techniques and theoretical simulations for molecular electronics. Highlights the major contributions and new concepts of integrating molecular functionalities into electrical circuits. Provides a critical discussion of limitations and main challenges that still exist for the development of molecular electronics. Suited for readers studying or doing research in the broad fields of Nano molecular electronics and other device related fields. *Molecular Scale Electronics* is an excellent book for materials scientists, electrochemists, electronics engineers, physical chemists, polymer chemists, and solid state chemists. It will also benefit physicists, semiconductor physicists, engineering scientists, and surface chemists.      *Molecular Electronics and Molecular Electronic Devices* Kristof Sienicki, 1993-03-25 *Molecular Electronics and Molecular Electronic Devices* is a book that provides a comprehensive review of current problems and information regarding all aspects of molecular electronics and molecular electronic devices. Experimental and theoretical aspects of molecular electronics and molecular electronic devices

are reviewed by distinguished researchers working in chemistry physics computer science and various areas of biology These books are excellent references for physicists chemists electronics engineers materials scientists and researchers interested in molecular electronics and molecular electronic devices *Molecular Electronics and Molecular Electronic Devices* Kristof Sienicki,1993-09-27 Molecular Electronics and Molecular Electronic Devices is a book that provides a comprehensive review of current problems and information regarding aspects of molecular electronics and molecular electronic devices Experimental and theoretical aspects of molecular electronics and molecular electronic devices are reviewed by distinguished researchers working in chemistry physics computer science and various areas of biology These books will be an excellent reference for physicists chemists electronics engineers and researchers interested in molecular electronics and molecular electronic devices *Molecular Electronics*, 1985 **Molecular Electronics** Ari Aviram, Mark A. Ratner, 1998 This volume explores the resurgence of interest in the field of molecular electronics in view of recent advances in such areas as molecular wires molecular components fabrication and assemblies of molecular scale devices and their wiring on surfaces It shows how molecular electronics offer scientists an opportunity to study and understand a new class of materials on the molecular level and in isolation while offering to engineers a new microelectronics technology *Molecular Electronics* Ioan Baldea, 2016-01-05 Molecular electronics an emerging research field at the border of physics chemistry and material sciences has attracted great interest in the last decade To achieve the ultimate goal of designing molecular electronic devices with the desired functionality and experimental manipulation at the single molecule level theoretical understanding of

**Molecular-Scale Electronics** Xuefeng Guo, 2018-12-06 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 **Molecular Electronics** Juan Carlos Cuevas, Elke Scheer, 2010 1 The birth of molecular electronics 1 1 Why molecular electronics 1 2 A brief history of molecular electronics 1 3 Scope and structure of the book 2 Fabrication of metallic atomic size contacts 2 1 Introduction 2 2 Techniques involving the scanning electron microscope STM 2 3 Methods using atomic force microscopes AFM 2 4 Contacts between macroscopic wires 2 5 Transmission electron microscope 2 6 Mechanically controllable break

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junctions 13 2 Some lessons from the resonant tunneling model 13 3 A two level model 13 4 Length dependence of the conductance 13 5 Role of conjugation in symbol electron systems 13 6 Fano resonances 13 7 Negative differential resistance 13 8 Final remarks 13 9 Exercises 14 Coherent transport through molecular junctions II test bed molecules 14 1 Coherent transport through some test bed molecules 14 2 Metal molecule contact the role of anchoring groups 14 3 Tuning chemically the conductance the role of side groups 14 4 Controlled STM based single molecule experiments 14 5 Conclusions and open problems 15 Single molecule transistors Coulomb blockade and Kondo physics 15 1 Introduction 15 2 Charging effects in transport through nanoscale devices 15 3 Single molecule three terminal devices 15 4 Coulomb blockade theory constant interaction model 15 5 Towards a theory of Coulomb blockade in molecular transistors 15 6 Intermediate coupling cotunneling and Kondo effect 15 7 Single molecule transistors experimental results 15 8 Exercises 16 Vibrationally induced inelastic current I experiment 16 1 Introduction 16 2 Inelastic electron tunneling spectroscopy IETS 16 3 Highly conductive junctions point contact spectroscopy PCS 16 4 Crossover between PCS and IETS 16 5 Resonant inelastic electron tunneling spectroscopy RIETS 16 6 Summary of vibrational signatures 17 Vibrationally induced inelastic current II theory 17 1 Weak electron phonon coupling regime 17 2 Intermediate electron phonon coupling regime 17 3 Strong electron phonon coupling regime 17 4 Concluding remarks and open problems 17 5 Exercises 18 The hopping regime and transport through DNA molecules 18 1 Signatures of the hopping regime 18 2 Hopping transport in molecular junctions experimental examples 18 3 DNA based molecular junctions 18 4 Exercises 19 Beyond electrical conductance shot noise and thermal transport 19 1 Shot noise in atomic and molecular junctions 19 2 Heating and heat conduction 19 3 Thermoelectricity in molecular junctions 20 Optical properties of current carrying molecular junctions 20 1 Surface enhanced Raman spectroscopy of molecular junctions 20 2 Transport mechanisms in irradiated molecular junctions 20 3 Theory of photon assisted tunneling 20 4 Experiments on radiation induced transport in atomic and molecular junctions 20 5 Resonant current amplification and other transport phenomena in ac driven molecular junctions 20 6 Fluorescence from current carrying molecular junctions 20 7 Molecular optoelectronic devices 20 8 Final remarks 20 9 Exercises 21 What is missing in this book      *Molecular Electronic Devices* Forrest L. Carter,1962      Molecular Electronics Michael C. Petty,2008-03-11 This consistent and comprehensive text is unique in providing an informed insight into molecular electronics by contrasting the prospects for molecular scale electronics with the continuing development of the inorganic semiconductor industry Providing a wealth of information on the subject from background material to possible applications Molecular Electronics contains all the need to know information in one easily accessible place Speculation about future developments has also been included to give the whole picture of this increasingly popular and important topic      Single Molecule Electronics and Nanofabrication of Molecular Electronic Devices Senthil Arun Rajagopal,2006 Molecular electronics is an emerging field that makes it possible to build electronic devices with single molecules as their active element The conductivity of single molecules can be manipulated to

perform functions similar to present day bulk electronic devices These single molecules with a size of few nano meters can be designed and chemically synthesized with tailored electronic structures This thesis focuses on the design fabrication and measurement of nanogap electronic devices The enabling device to study the conductivity of dimetal paddlewheel inorganic complexes using electrode pairs with nanometer separation is fabricated A study of these inorganic complexes would provide more versatile opportunities for tailoring electron transport properties The molecular complex and its electron transport mechanism are discussed and a detailed description of the fabrication of the nano gap electrode with a controlled gap size is provided Electron beam lithography fabrication techniques are discussed in detail A reliable method to fabricate a controlled nanogap with electrodeposition and electromigration is demonstrated The results of I V curves of gaps are used to estimate the nanogap dimensions via comparison to tunneling current theory

**Molecular Electronics Materials, Devices and Applications** Antoine Jalabert, Amara Amara, Fabien Clermidy, 2008-07-09 How to develop innovative architectures based on emerging molecular devices The simple yet ambitious objective of Molecular Electronics Materials Devices and Applications is to give the reader the necessary information to understand the challenges and opportunities of this recent field of research In order to provide a good overview and understanding the main molecular devices are first presented A complete set of presentation and discussion of the actual molecular architectures follows Nevertheless another goal of Molecular Electronics Materials Devices and Applications is also to promote a practical approach As a starting point for future developments a pragmatic methodology for VHDL AMS device modelling and circuit design based on experimental data is then proposed It includes an original fault tolerant memory architecture based on molecular electronics

*Molecular Electronic Devices* Forrest L. Carter, 1982

**Molecular Electronic Devices II** Carter, 1987-08-28

**Molecular Electronics** F.T. Hong, 2012-12-06

The dream of developing a biocomputer should not be dismissed as a sheer fantasy Although there is naturally some doubt as to whether it is possible to design a computer using carbon based components as in living organisms instead of silicon based components as in existing computers the fact that an average brain often outperforms the most sophisticated computer in terms of the complexity of tasks if not in terms of speed is a living testimony to this possibility The remaining question is to what extent a biocomputer can mimic a living organism and whether it is possible to design and fabricate such a biocomputer within the foreseeable future This volume does not attempt to provide immediate and exact answers to these questions but instead attempts to provide a vision and a progress report of the initial efforts This volume is mainly a collection of papers presented at the Symposium on Molecular Electronics Biosensors and Biocomputers sponsored by the Division of Biotechnology Health and Environment of the Fine Particle Society held from July 19-22 1989 at the Society's 19th Annual Meeting in Santa Clara California Also included are articles contributed by those who planned to attend the conference but were unable to do so The emergence of the field of molecular electronics is largely the consequence of one person's crusade that of Forrest L Carter

*Molecular Electronics* Gunter Mahler, 2020-08-12

Integrating molecular physics and information theory this work presents molecular electronics as a method for information storage and retrieval that incorporates nanometer scaled systems uses microscopic particles and exploits the laws of quantum mechanics It furnishes application examples employing properties of distinct molecules joined together to a macroscopic ensemble of virtually identical units      **Molecular Electronics** P.I. Lazarev,2012-12-06      **Historical Studies in the Societal Impact of Spaceflight** Steven J. Dick,2015

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