



Molecular Electronics

Michael C. Petty



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Molecular Electronics Juan Carlos Cuevas, Elke Scheer, 2010

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 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

Introducing Molecular Electronics Gianaurelio Cuniberti, Giorgos Fagas, Klaus Richter, 2006-05-21 Klaus von Klitzing Max Planck Institut für Festkörperforschung Heisenbergstraße 1 70569 Stuttgart Germany Already many Cassandras have prematurely announced the end of the silicon roadmap and yet conventional semiconductor based transistors have been continuously shrinking at a pace which has brought us to nowadays cheap and powerful microelectronics However it is clear that the traditional scaling laws cannot be applied if unwanted tunnel phenomena or ballistic transport dominate the device properties It is generally expected that a combination of silicon CMOS devices with molecular structure will dominate the field of nanoelectronics in 20 years The visionary ideas of atomic or molecular scale electronics already date back thirty years but only recently advanced nanotechnology including e.g. scanning tunneling methods and mechanically controllable break junctions have enabled to make distinct progress in this direction On the level of fundamental research state-of-the-art techniques allow to manipulate image and probe charge transport through single molecular systems in an increasingly controlled way Hence molecular electronics is reaching a stage of trustworthy and reproducible experiments This has led to a variety of physical and chemical phenomena recently observed for charge currents owing through molecular junctions posing new challenges to theory As a result a still increasing number of open questions determines the future agenda in this field

Molecular Electronics Juan Carlos Cuevas, Elke Scheer, 2010 This book provides a comprehensive overview of the rapidly developing field of molecular electronics It focuses on our present understanding of the electrical conduction in single molecule circuits and provides a thorough introduction to the experimental techniques and theoretical concepts It will also constitute as the first textbook like introduction to both the experiment and theory of electronic transport through single atoms and molecules In this sense this publication will prove invaluable to both researchers and students interested in the field of nanoelectronics and nanoscience in general Molecular Electronics is self contained and unified in its presentation It may be used as a textbook on nanoelectronics by graduate students and advanced undergraduates studying physics and chemistry In addition included are previously unpublished material that will help researchers gain a deeper understanding into the basic concepts involved in the field of molecular electronics

Molecular Electronics P.I. Lazarev, 2012-12-06

Molecular Electronics James M. Tour, 2003 This book presents an in depth discussion on molecular electronics in an easy to understand manner aiming at chemists computer scientists surface scientists physicists and applied mathematicians Lighter overviews are provided for the science minded layperson and the high tech entrepreneur in this nanoscale science The author has included a detailed synthetic chemistry treasure chest protocols of self assembling routes for bottom up fabrication atop silicon platforms representative current voltage and memory readouts from molecular devices and overviews of present architectural and mathematical approaches to programming molecular computing machines The investment and commercial insertion landscape is painted along with a

Who's Who in the molecular electronics business space Advice and forewarnings are provided in a practical yet witty manner for the aspiring academic corporate founder and the business CEO wannabe seeking to establish a high tech company while wading through the idiosyncratic morass of university personalities and university owned intellectual property *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

Molecular Electronics Mahler, 2020-08-11 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* 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* 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 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, Circuits, and Processing Platforms Sergey Edward Lyshevski, 2018-10-03 When microelectronic devices replaced vacuum tubes it marked a revolution in electronics that opened the way to the computer age We are on the verge of witnessing another equally profound shift As molecular devices replace semiconductors we will achieve new levels of performance functionality and capability that will hugely impact electronics as well as signal processing and computing Molecular Electronics Circuits and Processing Platforms guides you confidently into this emerging field Helping you to forge into the molecular frontier this book examines the various concepts methods and technologies used to approach and solve a wide variety of problems The author works from new devices to systems and platforms He also covers device level physics system level design analysis and advanced fabrication technologies Explore the latest and emerging molecular biomolecular and nanoscale processing platforms for building the next generation of circuits memories and computations By examining both solved and open issues this book thoroughly develops the basic theory and shows you how to apply this knowledge toward new developments and practical hardware implementation Don't fall behind Let Molecular Electronics Circuits and Processing Platforms take you to the next level of electronics design and applications

Nano and Molecular Electronics Handbook Sergey Edward Lyshevski, 2018-10-03 There are fundamental and technological limits of conventional microfabrication and microelectronics Scaling down conventional devices and attempts to develop novel topologies and architectures will soon be ineffective or unachievable at the device and system levels to ensure desired performance Forward looking experts continue to search for new paradigms to carry the field beyond the age of microelectronics and molecular electronics is one of the most promising candidates The Nano and Molecular Electronics Handbook surveys the current state of this exciting emerging field and looks toward future developments and opportunities Molecular and Nano Electronics Explained Explore the fundamentals of device physics synthesis and design of molecular processing platforms and molecular integrated circuits within three dimensional topologies organizations and architectures as well as bottom up fabrication utilizing quantum effects and unique phenomena Technology in Progress Stay current with the latest results and practical solutions realized for nanoscale and molecular electronics as well as biomolecular electronics and memories Learn design concepts device level modeling simulation methods and fabrication technologies used for today's applications and beyond Reports from the Front Lines of Research Expert innovators discuss the results of cutting edge research and provide informed and insightful commentary on where this new paradigm will lead The Nano and Molecular Electronics Handbook ranks among the most complete and authoritative guides to the past present and future of this revolutionary area of theory and technology

Materials and Measurements in Molecular Electronics Koji Kajimura, Shin-ichi Kuroda, 2012-12-06 Materials and Measurements in Molecular Electronics

presents new developments in one of the most promising areas of electronics technology for the 21st century Conjugated polymers carbon clusters and many other new molecular materials have been synthesized or discovered in recent years and some now are on the threshold of commercial application In the development of molecular materials detailed knowledge of the structures and electronic states of molecular aggregates is essential The focus of this book is on the development of new molecular materials and measuring techniques based on modern spectroscopy included are such topics as Langmuir Blodgett films cluster materials organic conductors and conjugated electroluminescent polymers

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Bio-sensors and Bio-computers L. Barsanti,V. Evangelista,P. Gualtieri,V. Passarelli,S. Vestri,2012-12-06 How fast and powerful can computers become Will it be possible someday to create artificial brains that have intellectual capabilities comparable to those of human beings The answers to these questions depend to a very great extent on a single factor how small and dense we can make computer circuits Very recently scientists have achieved revolutionary advances that may very well radically change the future of computing There are significant advantages to using biological molecules in a new computational paradigm since nature has solved similar problems to those encountered in harnessing organic molecules to perform data manipulation Biomolecules could be used as photonic devices in holography as spatial light modulators in neural network optical computing as nonlinear optical devices and as optical memories Such computers may use a billion times less energy than electronic computers while storing data in a trillionth of the space while also being highly parallel Research projects implemented by national and international groups have produced a large amount of data from multidisciplinary work ranging from physics and engineering to chemistry and biology

Organic and Molecular Electronics Michael C. Petty,2019-01-04 An introduction to the interdisciplinary subject of molecular electronics revised and updated The revised second edition of Organic and Molecular Electronics offers a guide to the fabrication and application of a wide range of electronic devices based around organic materials and low cost technologies Since the publication of the first edition organic electronics has greatly progressed as evidenced by the myriad companies that have been established to explore the new possibilities The text contains an introduction into the physics and chemistry of organic materials and includes a discussion of the means to process the materials into a form in most cases a thin film where they can be exploited in electronic and optoelectronic devices The text covers the areas of application and potential application that range from chemical and biochemical sensors to plastic light emitting displays The updated second edition reflects the recent progress in both organic and molecular electronics and Offers an accessible resource for a wide range of readers Contains a comprehensive text that covers topics including electrical conductivity optical phenomena electroactive organic compounds tools for molecular electronics and much more Includes illustrative examples based on the most recent research Presents problems at the end of each chapter to help reinforce key points Written mainly for engineering students Organic and Molecular Electronics From Principles to Practice provides an updated introduction to the interdisciplinary subjects of

organic electronics and molecular electronics with detailed examples of applications Organic Conductors, Superconductors and Magnets: From Synthesis to Molecular Electronics Lahcène Ouahab, Eduard Yagubskii, 2012-12-06 The book covers different aspects of the chemistry and physics of molecular materials including organic synthesis of specific organic donors and ligands organic metals and superconductors molecule based magnets multiproperty materials and organic inorganic hybrids The 17 chapters are written by some of the most authoritative authors in their field The two last chapters are devoted to molecular electronics and devices in particular the achievements and potential for applications An excellent work for all students and researchers in organic conductors superconductors and molecule based magnets

Molecular Electronics: An Introduction To Theory And Experiment (2nd Edition) Elke Scheer, Juan Carlos Cuevas, 2017-05-19 Molecular Electronics is self contained and unified in its presentation It can be used as a textbook on nanoelectronics by graduate students and advanced undergraduates studying physics and chemistry In addition included in this new edition are previously unpublished material that will help researchers gain a deeper understanding into the basic concepts involved in the field of molecular electronics **Substituted Coronenes for Molecular Electronics** Peter Kowalzik, 2010 *Lower-Dimensional Systems and Molecular Electronics* Robert M. Metzger, Peter R. Day, George C. Papavassiliou, 1990 Proceedings of a NATO ASI held at Hotel Spetses Spetses Island Greece June 12 23 1989

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