



Photovoltaic and Photoactive Materials - Properties, Technology and Applications

Edited by

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Photovoltaic And Photoactive Materials And Ndash Properties

**Sam-Shajing Sun,Niyazi Serdar
Sariciftci**



Photovoltaic And Photoactive Materials And Ndash Properties:

Books In Print 2004-2005 Ed Bowker Staff, Staff Bowker, Ed, 2004 **Books in Print Supplement** ,2002

Photovoltaic and Photoactive Materials Joseph M. Marshall, Doriana Dimova-Malinovska, 2012-12-06 The primary objective of this NATO Advanced Study Institute ASI was to present an up to date overview of various current areas of interest in the field of photovoltaic and related photoactive materials This is a wide ranging subject area of significant commercial and environmental interest and involves major contributions from the disciplines of physics chemistry materials electrical and instrumentation engineering commercial realisation etc Therefore we sought to adopt an inter disciplinary approach bringing together recognised experts in the various fields while retaining a level of treatment accessible to those active in specific individual areas of research and development The lecture programme commenced with overviews of the present relevance and historical development of the subject area plus an introduction to various underlying physical principles of importance to the materials and devices to be addressed in later lectures Building upon this the ASI then progressed to more detailed aspects of the subject area We were also fortunately able to obtain a contribution from Thierry Langlois d Estaintot of the European Commission Directorate describing present and future EC support for activities in this field In addition poster sessions were held throughout the meeting to allow participants to present and discuss their current activities These were supported by what proved to be very effective feedback sessions special thanks to Martin Stutzmann prior to which groups of participants enthusiastically met often in the bar to identify and agree topics of common interest

Special Issue: Photovoltaic and Photoactive Materials - Properties, Technology and Applications Kostadinka A. Geševa, 2003 **Photovoltaic and Photoactive Materials** K. A. Gesheva, Advanced Study Institute on Photovoltaic and Photoactive Materials - Properties, Technology and Application, 2003

Photovoltaic Materials Richard H Bube, 1998-05-30 Research and development of photovoltaic solar cells is playing an ever larger practical role in energy supply and ecological conservation all over the world Many materials science problems are encountered in understanding existing solar cells and the development of more efficient less costly and more stable cells This important and timely book provides a historical overview but concentrates primarily on exciting developments in the last decade It describes the properties of the materials that play an important role in photovoltaic applications the solar cell structures in which they are used and the experimental and theoretical developments that have led to the most promising contenders a A Study of Photoactive Materials for Solution-Processed Thin-Film Solar Cells Andrew Namespetra, 2015 *Novel Photoactive Materials* Maria Vittoria Diamanti, 2019-02-27 This book is a printed edition of the Special Issue Novel Photoactive Materials that was published in *Materials* *Organic Photovoltaics* Christoph Brabec, Ullrich Scherf, Vladimir Dyakonov, 2011-09-22 Providing complementary viewpoints from academia as well as technology companies this book covers the three most important aspects of successful device design materials device physics and manufacturing technologies It also offers an

insight into commercialization concerns such as packaging technologies system integration reel to reel large scale manufacturing issues and production costs With an introduction by Nobel Laureate Alan Heeger **Earth-Abundant Materials for Solar Cells** Sadao Adachi, 2015-10-28 Systematically describes the physical and materials properties of copper based quaternary chalcogenide semiconductor materials enabling their potential for photovoltaic device applications Intended for scientists and engineers in particular in the fields of multinary semiconductor physics and a variety of photovoltaic and optoelectronic devices **Polymer Photovoltaics** Fei Huang, Hin-Lap Yip, Yong Cao, 2016 An international perspective on the latest research in polymer solar cell technology Advanced Concepts in Photovoltaics Arthur J. Nozik, Gavin Conibeer, Matthew C Beard, 2014-07-10 Photovoltaic systems enable the sun's energy to be converted directly into electricity using semiconductor solar cells The ultimate goal of photovoltaic research and development is to reduce the cost of solar power to reach or even become lower than the cost of electricity generated from fossil and nuclear fuels The power conversion efficiency and the cost per unit area of the photovoltaic system are critical factors that determine the cost of photovoltaic electricity Until recently the power conversion efficiency of single junction photovoltaic cells has been limited to approximately 33% the so-called Shockley Queisser limit This book presents the latest developments in photovoltaics which seek to either reach or surpass the Shockley Queisser limit and to lower the cell cost per unit area Progress toward this ultimate goal is presented for the three generations of photovoltaic cells the 1st generation based on crystalline silicon semiconductors the 2nd generation based on thin film silicon compound semiconductors amorphous silicon and various mesoscopic structures and the 3rd generation based on the unique properties of nanoscale materials new inorganic and organic photoconversion materials highly efficient multi junction cells with low cost solar concentration and novel photovoltaic processes The extent to which photovoltaic materials and processes can meet the expectations of efficient and cost effective solar energy conversion to electricity is discussed Written by an international team of expert contributors and with researchers in academia national research laboratories and industry in mind this book is a comprehensive guide to recent progress in photovoltaics and essential for any library or laboratory in the field Emerging Photovoltaic Materials Santosh K. Kurinc, 2018-11-30 This book covers the recent advances in photovoltaics materials and their innovative applications Many materials science problems are encountered in understanding existing solar cells and the development of more efficient less costly and more stable cells This important and timely book provides a historical overview but concentrates primarily on the exciting developments in the last decade It includes organic and perovskite solar cells photovoltaics in ferroelectric materials organic inorganic hybrid perovskite materials with improved photovoltaic efficiencies as well as the full range of semiconductor materials for solar to electricity conversion from crystalline silicon and amorphous silicon to cadmium telluride copper indium gallium sulfide selenides dye sensitized solar cells organic solar cells and environmentally friendly copper zinc tin sulfide selenides **Organic Photovoltaics** Sam-Shajing Sun, Niyazi Serdar

Sariciftci, 2017-12-19 Recently developed organic photovoltaics OPVs show distinct advantages over their inorganic counterparts due to their lighter weight flexible shape versatile materials synthesis and device fabrication schemes and low cost in large scale industrial production Although many books currently exist on general concepts of PV and inorganic PV materials and devices few are available that offer a comprehensive overview of recently fast developing organic and polymeric PV materials and devices Organic Photovoltaics Mechanisms Materials and Devices fills this gap The book provides an international perspective on the latest research in this rapidly expanding field with contributions from top experts around the world It presents a unified approach comprising three sections General Overviews Mechanisms and Modeling and Materials and Devices Discussions include sunlight capture exciton diffusion and dissociation interface properties charge recombination and migration and a variety of currently developing OPV materials devices The book also includes two forewords one by Nobel Laureate Dr Alan J Heeger and the other by Drs Aloysius Hepp and Sheila Bailey of NASA Glenn Research Center Organic Photovoltaics equips students researchers and engineers with knowledge of the mechanisms materials devices and applications of OPVs necessary to develop cheaper lighter and cleaner renewable energy throughout the coming decades

Solar Cell Materials Arthur Willoughby, 2014-01-13 This book presents a comparison of solar cell materials including both new materials based on organics nanostructures and novel inorganics and developments in more traditional photovoltaic materials It surveys the materials and materials trends in the field including third generation solar cells multiple energy level cells thermal approaches and the modification of the solar spectrum with an eye firmly on low costs energy efficiency and the use of abundant non toxic materials

Chalcogenide Photovoltaics Roland Scheer, Hans-Werner Schock, 2011-03-31 This first comprehensive description of the most important material properties and device aspects closes the gap between general books on solar cells and journal articles on chalcogenide based photovoltaics Written by two very renowned authors with years of practical experience in the field the book covers II VI and I III VI₂ materials as well as energy conversion at heterojunctions It also discusses the latest semiconductor heterojunction models and presents modern analysis concepts Thin film technology is explained with an emphasis on current and future techniques for mass production and the book closes with a compendium of failure analysis in photovoltaic thin film modules With its overview of the semiconductor physics and technology needed this practical book is ideal for students researchers and manufacturers as well as for the growing number of engineers and researchers working in companies and institutes on chalcogenide photovoltaics

Novel Photoactive Materials, 2019 Photoactivity represents the ability of a material generally speaking a semiconductor to become active when interacting with light It can be declined in many ways and several functionalities arising from this behavior of materials can be exploited all leading to positive repercussions on our environment There are several classes of effects of photoactivity all of which have been deeply investigated in the last few decades allowing to develop more and more efficient materials and devices All of them share a common point that is the

interaction of a material with light although many different materials are taken into account depending on the effect desired from elemental semiconductors like silicon to more complex compounds like CdTe or GaAs to metal oxides like TiO₂ and ZnO. Given the broadness of the field a huge number of works fall within this topic and new areas of discovery are constantly explored. The special issue Novel Photoactive Materials has been proposed as a means to present recent developments in the field and for this reason the articles included touch different aspects of photoactivity from photocatalysis to photovoltaics to light emitting materials.

Progress in High-Efficient Solution Process Organic Photovoltaic Devices Yang Yang, Gang Li, 2015-02-26. This book presents an important technique to process organic photovoltaic devices. The basic materials aspects and manufacturing of photovoltaic devices with solution processing are explained. Solution processable organic solar cells polymer or solution processable small molecules have the potential to significantly reduce the costs for solar electricity and energy payback time due to the low material costs for the cells, low cost and fast fabrication processes, ambient roll to roll, high material utilization, etc. In addition, organic photovoltaics (OPV) also provides attractive properties like flexibility, colorful displays, and transparency, which could open new market opportunities. The material and device innovations lead to improved efficiency by 8% for organic photovoltaic solar cells compared to 4% in 2005. Both academic and industry research have significant interest in the development of this technology. This book gives an overview of the booming technology focusing on the solution process for organic solar cells and provides a state of the art report of the latest developments. World class experts cover fundamental materials, devices, and manufacturing technology of OPV technology.

Materials for Solar Energy Conversion R. Rajasekar, C. Moganapriya, A. Mohankumar, 2021-11-16. MATERIALS FOR SOLAR ENERGY CONVERSION. This book provides professionals and students with a resource on the basic principles and applications of solar energy materials and processes as well as practicing engineers who want to understand how functional materials operate in solar energy conversion systems. The demand for energy is increasing daily and the development of sustainable power generation is a critical issue. In order to overcome the energy demand, power generation through solar energy is booming. Many research works have attempted to enhance the efficiency of collection and storage of solar energy and as a result, numerous advanced functional materials have been developed for enhancing the performance of solar cells. This book has compiled and broadly explores the latest developments of materials, methods, and applications of solar energy. The book is divided into 2 parts in which the first part deals with solar cell fundamentals and emerging categories and the latter part deals with materials, methods, and applications in order to fill the gap between existing technologies and practical requirements. The book presents detailed chapters including organic, inorganic, coating materials, and collectors. The use of modern computer simulation techniques, conversion, and storage processes are effectively covered. Topics such as nanostructured solar cells, battery materials, etc. are included in this book as well. Audience: The book is aimed at researchers in materials science, chemistry, physics, electrical and mechanical engineering working in the fields of nanotechnology.

photovoltaic device technology and solar energy

Electronic Characterisation of Earth-Abundant Sulphides for Solar Photovoltaics Thomas James Whittles, 2018-07-31 This book examines the electronic structure of earth abundant and environmentally friendly materials for use as absorber layers within photovoltaic cells The corroboration between high quality photoemission measurements and density of states calculations yields valuable insights into why these materials have demonstrated poor device efficiencies in the vast literature cited The book shows how the materials underlying electronic structures affect their properties and how the band positions make them unsuitable for use with established solar cell technologies After explaining these poor efficiencies the book offers alternative window layer materials to improve the use of these absorbers The power of photoemission and interpretation of the data in terms of factors generally overlooked in the literature such as the materials oxidation and phase impurity is demonstrated Representing a unique reference guide the book will be of considerable interest and value to members of the photoemission community engaged in solar cell research and to a wider materials science audience as well

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