

1. Record Nr.	UNINA9910453279103321
Autore	Mertens Konrad <1963->
Titolo	Photovoltaics : fundamentals, technology and practice // Konrad Mertens ; translated by Gunther Roth
Pubbl/distr/stampa	Chichester, England : , : Wiley, , 2014 ©2014
ISBN	1-118-70336-7
Descrizione fisica	1 online resource (297 p.)
Altri autori (Persone)	RothGunther
Disciplina	621.6815/42
Soggetti	Photovoltaic power systems Photovoltaic power generation Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Photovoltaics: Fundamentals, Technology and Practice; Contents; Preface; Abbreviations; 1 Introduction; 1.1 Introduction; 1.1.1 Why Photovoltaics?; 1.1.2 Who Should Read this Book?; 1.1.3 Structure of the Book; 1.2 What is Energy?; 1.2.1 Definition of Energy; 1.2.2 Units of Energy; 1.2.3 Primary, Secondary and End Energy; 1.2.4 Energy Content of Various Substances; 1.3 Problems with Today's Energy Supply; 1.3.1 Growing Energy Requirements; 1.3.2 Tightening of Resources; 1.3.3 Climate Change; 1.3.4 Hazards and Disposal; 1.4 Renewable Energies; 1.4.1 The Family of Renewable Energies 1.4.2 Advantages and Disadvantages of Renewable Energies 1.5 Photovoltaic - The Most Important in Brief; 1.5.1 What Does "Photovoltaic" Mean?; 1.5.2 What are Solar Cells and Solar Modules?; 1.5.3 How is a Typical Photovoltaic Plant Structured?; 1.5.4 What Does a Photovoltaic Plant "Bring?"; 1.6 History of Photovoltaics; 1.6.1 How it all Began; 1.6.2 The First Real Solar Cells; 1.6.3 From Space to Earth; 1.6.4 From Toy to Energy Source; 2 Solar Radiation; 2.1 Properties of Solar Radiation; 2.1.1 Solar Constant; 2.1.2 Spectrum of the Sun; 2.1.3 Air Mass; 2.2 Global Radiation 2.2.1 Origin of Global Radiation 2.2.2 Contributions of Diffuse and Direct Radiation; 2.2.3 Global Radiation Maps; 2.3 Calculation of the Position of the Sun; 2.3.1 Declination of the Sun; 2.3.2 Calculating the

Path of the Sun; 2.4 Radiation on Tilted Surfaces; 2.4.1 Radiation Calculation with the Three-Component Model; 2.4.2 Radiation Estimates with Diagrams and Tables; 2.4.3 Yield Gain through Tracking; 2.5 Radiation Availability and World Energy Consumption; 2.5.1 The Solar Radiation Energy Cube; 2.5.2 The Sahara Miracle; 3 Fundamentals of Semiconductor Physics  
3.1 Structure of Semiconductors 3.1.1 Bohr's Atomic Model; 3.1.2 Periodic Table of the Elements; 3.1.3 Structure of the Silicon Crystal; 3.1.4 Compound Semiconductors; 3.2 Band Model of the Semiconductor; 3.2.1 Origin of Energy Bands; 3.2.2 Differences in Isolators, Semiconductors and Conductors; 3.2.3 Intrinsic Carrier Concentration; 3.3 Charge Transport in Semiconductors; 3.3.1 Field Currents; 3.3.2 Diffusion Currents; 3.4 Doping of Semiconductors; 3.4.1 n-Doping; 3.4.2 p-Doping; 3.5 The p-n Junction; 3.5.1 Principle of Method of Operation; 3.5.2 Band Diagram of the p-n Junction 3.5.3 Behavior with Applied Voltage 3.5.4 Diode Characteristics; 3.6 Interaction of Light and Semiconductors; 3.6.1 Phenomenon of Light Absorption; 3.6.2 Light Reflection on Surfaces; 4 Structure and Method of Operation of Solar Cells; 4.1 Consideration of the Photodiode; 4.1.1 Structure and Characteristics; 4.1.2 Equivalent Circuit; 4.2 Method of Function of the Solar Cell; 4.2.1 Principle of the Structure; 4.2.2 Recombination and Diffusion Length; 4.2.3 What Happens in the Individual Cell Regions?; 4.2.4 Back-Surface Field; 4.3 Photocurrent; 4.3.1 Absorption Efficiency  
4.3.2 Quantum Efficiency

---

## Sommario/riassunto

Concise introduction to the basic principles of solar energy, photovoltaic systems, photovoltaic cells, photovoltaic measurement techniques, and grid connected systems, overviewing the potential of photovoltaic electricity for students and engineers new to the topic After a brief introduction to the topic of photovoltaics' history and the most important facts, Chapter 1 presents the subject of radiation, covering properties of solar radiation, radiation offer, and world energy consumption. Chapter 2 looks at the fundamentals of semiconductor physics. It discusses the bui

---