1. Record Nr. UNINA9910876945903321

Titolo	Handbook of photovoltaic science and engineering / / edited by Antonio Luque and Steven Hegedus
Pubbl/distr/stampa	Chichester, West Sussex, U.K., : Wiley, 2011
ISBN	1-283-37290-8 9786613372901 0-470-97466-4 1-61344-185-1 0-470-97470-2
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (1170 p.)
Altri autori (Persone)	LuqueA (Antonio) HegedusSteven
Disciplina	621.31/244
Soggetti	Photovoltaic cells Photovoltaic power generation
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	Handbook of Photovoltaic Science and Engineering; Contents; About the Editors; List of Contributors; Preface to the 2nd Edition; 1 Achievements and Challenges of Solar Electricity from Photovoltaics; 1.1 The Big Picture; 1.2 What is Photovoltaics?; 1.2.1 Rating of PV Modules and Generators; 1.2.2 Collecting Sunlight: Tilt, Orientation, Tracking and Shading; 1.2.3 PV Module and System Costs and Forecasts; 1.3 Photovoltaics Today; 1.3.1 But First, Some PV History; 1.3.2 The PV Picture Today; 1.3.3 The Crucial Role of National Policies; 1.3.4 Grid Parity: The Ultimate Goal for PV 1.4 The Great Challenge1.4.1 How Much Land Is Needed?; 1.4.2 Raw Materials Availability; 1.4.3 Is Photovoltaics a Clean Green Technology?; 1.4.4 Energy Payback; 1.4.5 Reliability; 1.4.6 Dispatchability: Providing Energy on Demand; 1.5 Trends in Technology; 1.5.1 Crystalline Silicon Progress and Challenges; 1.5.2 Thin Film Progress and Challenges; 1.5.3 Concentrator Photovoltaics Progress and Challenges; 1.5.4 Third-Generation Concepts; 1.6 Conclusions; References; 2 The Role of Policy in PV Industry Growth: Past, Present and Future; 2.1 Introduction

2.1.1 Changing Climate in the Energy Industry2.1.2 PV Markets; 2.2 Policy Review of Selected Countries; 2.2.1 Review of US Policies; 2.2.2 Europe; 2.2.3 Asia; 2.3 Policy Impact on PV Market Development; 2.4 Future PV Market Growth Scenarios; 2.4.1 Diffusion Curves; 2.4.2 Experience Curves; 2.4.3 PV Diffusion in the US under Different Policy Scenarios; 2.5 Toward a Sustainable Future; References; 3 The Physics of the Solar Cell; 3.1 Introduction; 3.2 Fundamental Properties of Semiconductors; 3.2.1 Crystal Structure; 3.2.2 Energy Band Structure 3.2.3 Conduction-band and Valence-band Densities of State3.2.4 Equilibrium Carrier Concentrations; 3.2.5 Light Absorption; 3.2.6 Recombination; 3.2.7 Carrier Transport; 3.2.8 Semiconductor Equations; 3.2.9 Minority-carrier Diffusion Equation; 3.2.10 pn-junction Diode Electrostatics; 3.2.11 Summary; 3.3 Solar Cell Fundamentals; 3.3.1 Solar Cell Boundary Conditions; 3.3.2 Generation Rate; 3.3.3 Solution of the Minority-carrier Diffusion Equation; 3.3.4 Derivation of the Solar Cell I -V Characteristic; 3.3.5 Interpreting the Solar Cell I -V Characteristic
3.3.6 Properties of Efficient Solar Cells3.3.7 Lifetime and Surface Recombination Effects; 3.4 Additional Topics; 3.4.1 Spectral Response; 3.4.2 Parasitic Resistance Effects; 3.4.3 Temperature Effects; 3.4.4 Concentrator Solar Cells; 3.4.5 High-level Injection; 3.4.6 p-i-n Solar Cells and Voltage-dependent Collection; 3.4.7 Heterojunction Solar Cells; 3.4.8 Detailed Numerical Modeling; 3.5 Summary; References; 4 Theoretical Limits of Photovoltaic Conversion and New-generation Solar Cells; 4.1 Introduction; 4.2 Thermodynamic Background; 4.2.1 Basic Relationships
4.2.2 The Two Laws of Thermodynamics

Sommario/riassunto

The most comprehensive, authoritative and widely cited reference on photovoltaic solar energy Fully revised and updated, the Handbook of Photovoltaic Science and Engineering, Second Edition incorporates the substantial technological advances and research developments in photovoltaics since its previous release. All topics relating to the photovoltaic (PV) industry are discussed with contributions by distinguished international experts in the field. Significant new coverage includes: three completely new chapters and six chapters with new authors de