1. Record Nr. UNINA990008793760403321

Autore	Piccione, Enrico
Titolo	Le leggi biologiche e le leggi giuridiche in rapporto alla questione sociale : saggio critico / E. Piccione
Pubbl/distr/stampa	Roma : Forzani e C, 1892
Descrizione fisica	119 p. ; 23 cm
Disciplina	340
Locazione	FGBC
Collocazione	XV N 194
Lingua di pubblicazione	Italiano
Formato	Materiale a stampa
Livello bibliografico	Monografia

2. Record Nr. UNINA9910819466403321

Autore	Chen C. Julian
Titolo	Physics of solar energy / / C. Julian Chen
Pubbl/distr/stampa	Hoboken, N.J., : John Wiley & Sons, c2011
ISBN	9786613246516 9781283246514 1283246511 9781118172841 1118172841 9781118044575 1118044576 9781118044599 1118044592
Edizione	[1st ed.]
Descrizione fisica	xxvi, 326 p., [15] p. of plates : ill. (some col.), maps (some col.)
Classificazione	SCI065000
Disciplina	621.47
Soggetti	Solar energy Energy development Solar radiation
Lingua di pubblicazione	Inglese

Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Physics of Solar Energy -- Contents -- Preface -- List of Figures -- List of Tables -- Chapter 1: Introduction -- 1.1 Solar Energy -- 1.2 Go beyond Petroleum -- 1.3 Other Renewable Energy Resources -- 1.3.1 Hydroelectric Power -- 1.3.2 Wind Power -- 1.3.3 Biomass and Bioenergy -- 1.3.4 Shallow Geothermal Energy -- 1.3.5 Deep Geothermal Energy -- 1.4 Solar Photovoltaics Primer -- 1.4.1 Birth of Modern Solar Cells -- 1.4.2 Some Concepts on Solar Cells -- 1.4.3 Types of Solar Cells -- 1.4.4 Energy Balance -- 1.5 Above Physics -- 1.5.1 Economics of Solar Energy -- 1.5.2 Moral Equivalence of War -- 1.5.3 Solar Water Heaters over the World -- 1.5.4 Photovoltaics: Toward Grid Parity -- Problems -- Chapter 2: Nature of Solar Radiation -- 2.1 Light as Electromagnetic Waves -- 2.1.1 Maxwell's Equations -- 2.1.2 Vector Potential -- 2.1.3 Electromagnetic Waves -- 2.1.4 Plane Waves -- 2.1.5 Polarization of Light -- 2.1.6 Motion of an Electron in Electric and Magnetic Fields -- 2.2 Optics of Thin Films -- 2.2.1 Relative Dielectric Constant and Refractive Index -- 2.2.2 Energy Balance and Poynting Vector -- 2.2.3 Fresnel Formulas -- 2.3 Blackbody Radiation -- 2.3.1 Rayleigh-Jeans Law -- 2.3.2 Planck Formula and Stefan-Boltzmann's Law -- 2.4 Photoelectric Effect and Concept of Photons -- 2.4.1 Einstein's Theory of Photons -- 2.4.2 Millikan's Experimental Verification -- 2.4.3 Wave-Particle Duality -- 2.5 Einstein's Derivation of Blackbody Formula -- Problems -- Chapter 3: Origin of Solar Energy -- 3.1 Basic Parameters of the Sun -- 3.1.1 Distance -- 3.1.2 Mass -- 3.1.3 Radius -- 3.1.4 Emission Power -- 3.1.5 Surface Temperature -- 3.1.6 Composition -- 3.2 Kelvin-Helmholtz Time Scale -- 3.3 Energy Source of the Sun -- 3.3.1 The p - p Chain -- 3.3.2 Carbon Chain -- 3.3.3 Internal Structure of the Sun -- Problems -- Chapter 4: Tracking Sunlight. 4.1 Rotation of Earth: Latitude and Longitude -- 4.2 Celestial Sphere -- 4.2.1 Coordinate Transformation: Cartesian Coordinates -- 4.2.2 Coordinate Transformation: Spherical Trigonometry -- 4.3 Treatment in Solar Time -- 4.3.1 Obliquity and Declination of the Sun -- 4.3.2 Sunrise and Sunset Time -- 4.3.3 Direct Solar Radiation on an Arbitrary Surface -- 4.3.4 Direct Daily Solar Radiation Energy -- 4.3.5 The 24 Solar Terms -- 4.4 Treatment in Standard Time -- 4.4.1 Sidereal Time and Solar Time -- 4.4.2 Right Ascension of the Sun -- 4.4.3 Time Difference Originated from Obliquity -- 4.4.4 Aphelion and Perihelion -- 4.4.5 Time Difference Originated from Eccentricity -- 4.4.6 Equation of Time -- 4.4.7 Declination of the Sun -- 4.4.8 Analemma -- Problems -- Chapter 5: Interaction of Sunlight with Earth -- 5.1 Interaction of Radiation with Matter -- 5.1.1 Absorptivity, Reffectivity, and Transmittivity -- 5.1.2 Emissivity and Kirchho.'s Law -- 5.1.3 Bouguer-Lambert-Beer's Law -- 5.2 Interaction of Sunlight with Atmosphere -- 5.2.1 AM1.5 Reference Solar Spectral Irradiance -- 5.2.2 Annual Insolation Map -- 5.2.3 Clearness Index -- 5.2.4 Beamand Diffuse Solar Radiation -- 5.3 Penetration of Solar Energy into Earth -- Problems -- Chapter 6: Thermodynamics of Solar Energy -- 6.1 Definitions -- 6.2 First Law of Thermodynamics -- 6.3 Second Law of Thermodynamics -- 6.3.1 Carnot Cycle -- 6.3.2 Thermodynamic Temperature -- 6.3.3 Entropy -- 6.4 Thermodynamic Functions -- 6.4.1 Free Energy -- 6.4.2 Enthalpy -- 6.4.3 Gibbs Free Energy -- 6.4.4 Chemical Potential -- 6.5 Ideal Gas -- 6.6 Ground Source Heat Pump and Air Conditioning -- 6.6.1 Theory -- 6.6.2 Coeffcient of

Performance -- 6.6.3 Vapor-Compression Heat Pump and Refrigerator -- 6.6.4 Ground Heat Exchanger -- Problems -- Chapter 7: Quantum Transitions -- 7.1 Basic Concepts of Quantum Mechanics.
7.1.1 Quantum States: Energy Levels and Wavefunctions -- 7.1.2 Dynamic Variables and Equation of Motion -- 7.1.3 One-Dimensional Potential Well -- 7.1.4 Hydrogen Atom -- 7.2 Many-Electron Systems -- 7.2.1 Single-Electron Approximation -- 7.2.2 Direct Observation of Quantum States -- 7.2.3 Quantum States of Molecules: HOMO and LUMO -- 7.2.4 Quantum States of a Nanocrystal -- 7.3 The Golden Rule -- 7.3.1 Time-Dependent Perturbation by Periodic Disturbance -- 7.3.2 Golden Rule for Continuous Spectrum -- 7.3.3 Principle of Detailed Balance -- 7.4 Interactions with Photons -- Problems -- Chapter 8: pn-Junctions -- 8.1 Semiconductors -- 8.1.1 Conductor, Semiconductor, and Insulator -- 8.1.2 Electrons and Holes -- 8.1.3 p-Type and n-Type Semiconductors -- 8.2 Formation of a pn-Junction -- 8.3 Analysis of pn-Junctions -- 8.3.1 Effect of Bias Voltage -- 8.3.2 Lifetime of Excess Minority Carriers -- 8.3.3 Junction Current -- 8.3.4 Shockley Equation -- Problems -- Chapter 9: Semiconductor Solar Cells -- 9.1 Basic Concepts -- 9.1.1 Generation of Electric Power -- 9.1.2 Solar Cell Equation -- 9.1.3 Maximum Power and Fill Factor -- 9.2 The Shockley-Queisser Limit -- 9.2.1 Ultimate Efficiency -- 9.2.2 Role of Recombination Time -- 9.2.3 Detailed-Balance Treatment -- 9.2.4 Nominal Efficiency -- 9.2.5 Shockley-Queisser Efficiency Limit -- 9.2.6 Efficiency Limit for AM1.5 Radiation -- 9.3 Nonradiative Recombination Processes -- 9.3.1 Auger Recombination -- 9.3.2 Trap-State Recombination -- 9.3.3 Surface-State Recombination -- 9.4 Antireffection Coatings -- 9.4.1 Matrix Method -- 9.4.2 Single-Layer Antireffection Coating -- 9.4.3 Double-Layer Antireffection Coatings -- 9.5 Crystalline Silicon Solar Cells -- 9.5.1 Production of Pure Silicon -- 9.5.2 Solar Cell Design and Processing -- 9.5.3 Module Fabrication -- 9.6 Thin-Film Solar Cells -- 9.6.1 CdTe Solar Cells.
9.6.2 CIGS Solar Cells -- 9.6.3 Amorphous Silicon Thin-Film Solar Cells -- 9.7 Tandem Solar Cells -- Problems -- Chapter 10: Solar Electrochemistry -- 10.1 Physics of Photosynthesis -- 10.1.1 Chlorophyll -- 10.1.2 ATP: Universal Energy Currency of Life -- 10.1.3 NADPH and NADP+ -- 10.1.4 Calvin Cycle -- 10.1.5 C4 Plants versus C3 Plants -- 10.1.6 Chloroplast -- 10.1.7 Efficiency of Photosynthesis -- 10.2 Artificial Photosynthesis -- 10.3 Genetically Engineered Algae -- 10.4 Dye-Sensitized Solar Cells -- 10.5 Bilayer Organic Solar Cells -- Problems -- Chapter 11: Solar Thermal Energy -- 11.1 Early Solar Thermal Applications -- 11.2 Solar Heat Collectors -- 11.2.1 Selective Absorption Surface -- 11.2.2 Flat-Plate Collectors -- 11.2.3 All-Glass Vacuum-Tube Collectors -- 11.2.4 Thermosiphon Solar Heat Collectors -- 11.2.5 High-Pressure Vacuum Tube Collectors -- 11.3 Solar Water Heaters -- 11.3.1 System with Thermosiphon Solar Heat Collectors -- 11.3.2 System with Pressurized Heat-Exchange Coils -- 11.3.3 System with a Separate Heat-Exchange Tank -- 11.4 Solar Thermal Power Systems -- 11.4.1 Parabolic Trough Concentrator -- 11.4.2 Central Receiver with Heliostats -- 11.4.3 Paraboloidal Dish Concentrator with Stirling Engine -- 11.4.4 Integrated Solar Combined Cycle -- 11.4.5 Linear Fresnel Reffector (LFR) -- Problems -- Chapter 12: Energy Storage -- 12.1 Sensible Heat Energy Storage -- 12.1.1 Water -- 12.1.2 Solid Sensible Heat Storage Materials -- 12.1.3 Synthetic Oil in Packed Beds -- 12.2 Phase Transition Thermal Storage -- 12.2.1 Water-Ice Systems -- 12.2.2 Paraffin Wax and Other Organic Materials -- 12.2.3 Salt Hydrates -- 12.2.4 Encapsulation of PCM -- 12.3 Rechargeable Batteries -- 12.3.1 Electrochemistry of Rechargeable Batteries -- 12.3.2 Lead-Acid Batteries -- 12.3.3 Nickel Metal Hydride

Batteries -- 12.3.4 Lithium-Ion Batteries.

12.3.5 Mineral Resource of Lithium -- 12.4 Solar Energy and Electric Vehicles -- Problems -- Chapter 13: Building with Sunshine -- 13.1 Early Solar Architecture -- 13.1.1 Ancient Solar Architecture -- 13.1.2 Holistic Architecture in Rural China -- 13.2 Building Materials -- 13.2.1 Thermal Resistance -- 13.2.2 Specific Thermal Resistance -- 13.2.3 Heat Transfer Coefficient: the U-Value -- 13.2.4 Thermal Mass -- 13.2.5 Glazing -- 13.3 Example of Holistic Design -- 13.4 Land Usage of Solar Communities -- Problems -- Appendix A: Energy Unit Conversion -- Appendix B: Spherical Trigonometry -- B.1 Spherical Triangle -- B.2 Cosine Formula -- B.3 Sine Formula -- B.4 Formula C -- Problems -- Appendix C: Quantum Mechanics Primer -- C.1 Harmonic Oscillator -- C.2 Angular Momentum -- C.3 Hydrogen Atom -- Appendix D: Statistics of Particles -- D.1 Maxwell-Boltzmann Statistics -- D.2 Fermi-Dirac Statistics -- Appendix E: AM1.5 Reference Solar Spectrum -- List of Symbols -- Bibliography -- Index.

Sommario/riassunto

"This book covers the fundamental physics of the most abundant energy resource available to human society--solar energy. Similar to other technologies, the first step to achieving success is to have a firm understanding of the basic science of solar energy and its use. The subject matter of this text is designed to give the reader this solid footing, which will be the basis of research and the development of new solar engineering technologies. Homework problems and exercises to reinforce the contents along with a solutions manual for instructors"--