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1.16 Carrier Diffusion and the Einstein Relation1.17 Quasi-Fermi Energies; 1.18 The Diffusion Equation; 1.19 Traps and Carrier Lifetimes; 1.20 Alloy Semiconductors; 1.21 Summary; Suggestions for Further Reading; Problems; 2 The PN Junction Diode; 2.1 Introduction; 2.2 Diode Current; 2.3 Contact Potential; 2.4 The Depletion Approximation; 2.5 The Diode Equation; 2.6 Reverse Breakdown and the Zener Diode; 2.7 Tunnel Diodes; 2.8 Generation/Recombination Currents; 2.9 Ohmic Contacts, Schottky Barriers and Schottky Diodes; 2.10 Heterojunctions; 2.11 Alternating Current (AC) and Transient Behaviour
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4.7 Solar Cell Efficiency4.8 Silicon Solar Cell Technology: Wafer Preparation; 4.9 Silicon Solar Cell Technology: Solar Cell Finishing; 4.10 Silicon Solar Cell Technology: Advanced Production Methods; 4.11 Thin Film Solar Cells: Amorphous Silicon; 4.12 Telluride/Selenide/Sulphide Thin-Film Solar Cells; 4.13 High-Efficiency Multijunction Solar Cells; 4.14 Concentrating Solar Systems; 4.15 Summary; Suggestions for Further Reading; Problems; 5 Light Emitting Diodes; 5.1 Introduction; 5.2 LED Operation and Device Structures; 5.3 Emission Spectrum; 5.4 Non-Radiative Recombination
5.5 Optical Outcoupling5.6 GaAs LEDs; 5.7 GaAs1-xPx LEDs; 5.8 Double Heterojunction AlxGa1-xAs LEDs; 5.9 AlGaInP LEDs; 5.10 Ga1-xInxN LEDs; 5.11 LED Structures for Enhanced Outcoupling and Power Output; 5.12 Summary; Suggestions for Further Reading; Problems; 6 Organic Semiconductors, OLEDs and Solar Cells; 6.1 Introduction to Organic Electronics; 6.2 Conjugated Systems; 6.3 Polymer OLEDs; 6.4 Small-Molecule OLEDs; 6.5 Anode Materials; 6.6 Cathode Materials; 6.7 Hole Injection Layer; 6.8 Electron Injection Layer; 6.9 Hole Transport Layer; 6.10 Electron Transport Layer
6.11 Light Emitting Material Processes

Sommario/riassunto

The book will cover the two most important applications of semiconductor diodes - solar cells and LEDs - together with quantitative coverage of the physics of the PN junction at the senior undergraduate level. It will include: Review of semiconductor physicsIntroduction to PN diodesThe solar cellPhysics of efficient conversion of sunlight into electrical energySemiconductor solar cell materials and device physicsAdvanced solar cell materials and devicesThe light emitting diodePhysics of efficient conversion of electrical energy into lightSemiconductor li