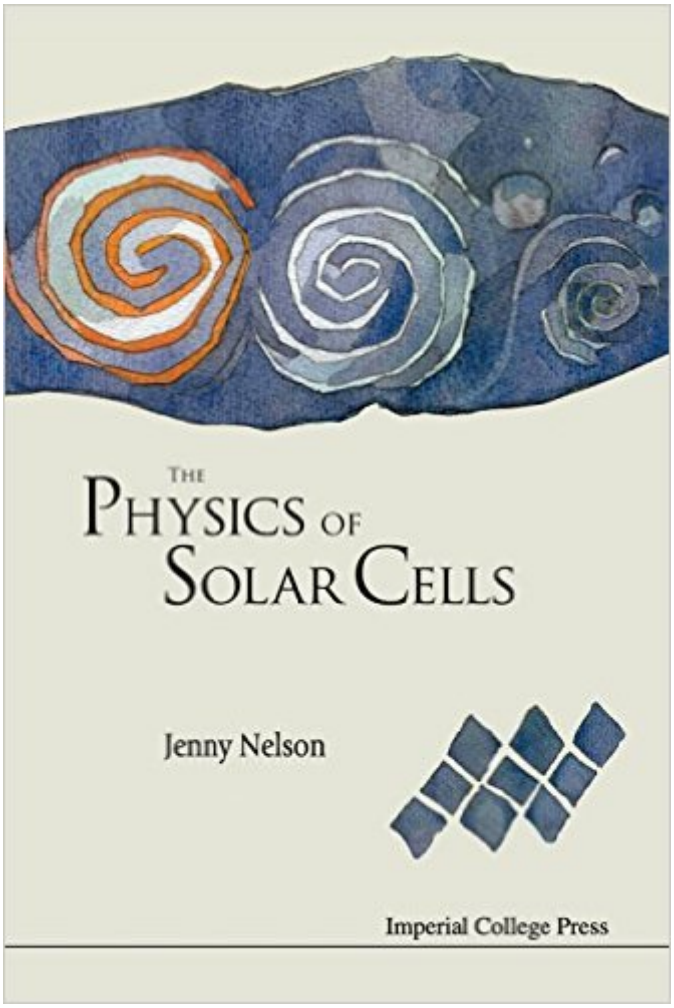
The Physics Of Solar Cells (Properties Of Semiconductor Materials)



Synopsis

This book provides a comprehensive introduction to the physics of the photovoltaic cell. It is suitable for undergraduates, graduate students, and researchers new to the field. It covers: basic physics of semiconductors in photovoltaic devices; physical models of solar cell operation; characteristics and design of common types of solar cell; and approaches to increasing solar cell efficiency. The text explains the terms and concepts of solar cell device physics and shows the reader how to formulate and solve relevant physical problems. Exercises and worked solutions are included. Contents: Photons In, Electrons Out: Basic Principles of PV; Electrons and Holes in Semiconductors; Generation and Recombination; Junctions; Analysis of the p n Junction; Monocrystalline Solar Cells; Thin Film Solar Cells; Managing Light; Over the Limit: Strategies for Higher Efficiency.

Book Information

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Customer Reviews

I feel this is a very good book for advanced undergraduatesand graduate students interested in the physics of solar cells. Itis not a beginner book, as some background is expected.Solid state physics is difficult and complicated. There are a lotof different things going on at the same time, and I feel it’s good toget explanations from several different authors viewpoints. I haveseveral books now on the subject, but I find myself looking atthis one more than the others. I think the author fills in a lot ofdetails missing in other texts.

This book is an introductory textbook on photovoltaic devices and the underlying physics. Prerequisites are not mentioned by the author. In my opinion, the book is not self-contained, as it requires prior exposure to solid state physics and mathematics (e.g. Bloch's theorem, bra-ket notation, partial differential equations). Although there is a section on band theory, I would recommend other condensed matter textbooks for a rigorous derivation. In terms of device physics, it would be helpful if the reader already has some knowledge at the level of, say, "Solid State Electronic Devices" by Streetman and Banerjee. In terms of quantum physics, the level of "Introduction to Quantum Mechanics" by Griffiths and some understanding of the Shockley-Queisser detailed balance theory should suffice.This is NOT a book on the manufacturing of solar cell modules with all the industrial optimization processes, or thin film deposition techniques. It focuses on the phenomenological behavior of photovoltaic devices, from conventional single crystal silicon to thin film solar cells, and their pros and cons. It concludes with the final chapter on modern research ideas for higher efficiency, leaving the detailed discussion to further reading.To be really picky, some of the figures look as if they were drawn in Paint (e.g. shaky curves), and there are a few typographical errors. Nonetheless, these imperfections do not impair comprehension.

This book is very approachable, reasonably comprehensive, and connected to some of the most recent research topics. Of the three books I have read on the subject of solar cells, this is my favorite. The book contains discussions on solar cell behavior from a thermodynamic and electrical engineering perspective, which I liked. I also found it to discuss the topic from a more fundamental perspective. Rather than just skim the surface of the major results of solar cell theory, it builds up the framework in an manner which is reasonably straightforward.

This is a great book for senior undergrads and graduate students. It focuses on other solar cell materials besides Silicon. It was a great reference for teaching material and I referenced it in my PhD thesis. I recommend this book in addition to Martin Green's Solar Cell book (standard undergrad solar cell reference book.)

This book provides a well thought out introduction to the physics of photovoltaic cells and systems. The treatment provides mathematical details at a level that will be accessible to science and engineering graduates and upper class undergraduates. Some derivations are not as well explained as others. However, the working relationships are worth knowing and can serve as a lead into other references. The book is well worth its relatively modest cost.

Overall this is a good book, more mathematically detailed than Green's classical book on solar cells, but not quite the same clarity and writing quality as Green. But the book does have a lot of good information, and I learned a lot reading it.However, on the Kindle this is almost unreadable in places (kindle classic or fire hd). The equations are in tiny fonts (unchangeable) and many graphs and figures are so small and blurry that you can't read them. really needs to do a better job on the kindle tech books it releases.

I am a newcomer to the field of photovoltaics and was looking for a book simple to understand but robust in content that would convey the fundamental concepts effectively. So far I am halfway through the book, reading during my coffee breaks and before bedtime and I am thoroughly enjoying it. I came to choose this book not by anyone's recommendation or referral but by the affordability and judging the table of content and few sample pages. Most of the other books in this area are so expensive, you have to sort of gamble a hefty amount of money to gain a very little perspective on the nature and scope of the field of photovoltaics. This book so far seems to be very good except there are some countable number of typos that sort of distract during the reading.

I'm a PhD student and I'm working on quantum dot solar cells. However, concepts in this book is very clear, precise and useful in explaining how solar cell works. After reading for a few hours, I already learned a lot which I didn't know before.

Designing and Installing Photovoltaic Solar Electric Systems The Solid State: An Introduction to the Physics of Crystals for Students of Physics, Materials Science, and Engineering (Oxford Physics Series) Semiconductors for Solar Cells (Artech House Optoelectronics Library) Copper Zinc Tin Sulfide-Based Thin Film Solar Cells Electronic Structure and the Properties of Solids: The Physics of the Chemical Bond (Dover Books on Physics) Ceramics: Mechanical Properties, Failure Behaviour, Materials Selection (Springer Series in Materials Science) Craig's Restorative Dental Materials, 12e (Dental Materials: Properties & Manipulation (Craig)) Restorative Dental Materials, 11e (Dental Materials: Properties & Manipulation (Craig)) Semiconductor Devices: Physics And Technology, 2Nd Ed Introductory Semiconductor Device Physics Semiconductor Physics And Devices: Basic Principles Introduction to Semiconductor Physics Volume 1