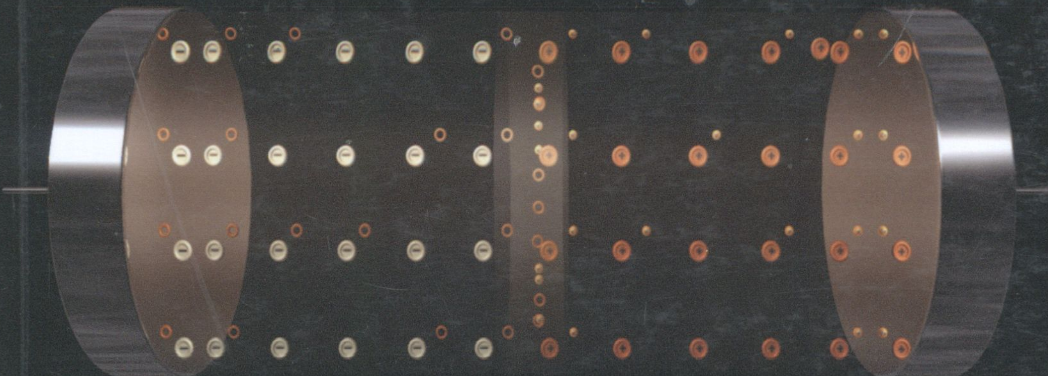
ESSENTIALS OF SEMICONDUCTOR DEVICE PHYSICS



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Essentials of Semiconductor Device Physics

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Contents

An introductory semiconductor device physics textbook that is accessible to readers without a background in statistical physics

The subject of this book is the physics of semiconductor devices, which is an important topic i engineering and physics because it forms the background for electronic and optoelectronic device including solar cells. The author aims to provide students and teachers with a concise text tha focuses on semiconductor devices and covers the necessary background in statistical physics.

This text introduces the key prerequisite knowledge in a simple, clear, and friendly manner. I distills the key concepts of semiconductor devices down to their essentials, enabling students t master this key subject in engineering, physics, and materials. The subject matter treated in thi book is directly connected to the physics of p-n junctions and solar cells, which has become a topi of intense interest in the last decade. Sample topics covered within the text include:

- Chemical potential, Fermi level, Fermi-Dirac distribution, drift current and diffusion current
- The physics of semiconductors, band theory and intuitive derivations of the concentration of charge carriers.
- The p-n junction, with qualitative analysis preceding the mathematical descriptions.
- A derivation of the current vs voltage relation in p-n junctions (Shockley equation).
- Important applications of p-n junctions, including solar cells
- The two main types of transistors: Bipolar Junction Transistors (BJT) and Metal Oxide Semiconductor Field Effect Transistors (MOSFET)

For students and instructors, it may be used as a primary textbook for an introductor semiconductor device physics course and is suitable for a course of approximately 30-50 hour Scientists studying and researching semiconductor devices in general, and solar cells in particula will also benefit from the clear and intuitive explanations found in this book.

Emiliano R. Martins obtained his PhD in 2014 from the University of St. Andrews (UK) in th field of photonics, which deals with the interaction between light and matter in semiconducto devices. His research field involves solar cells and other optoelectronic devices and he has bee teaching a course on semiconductor device physics since 2016 at the University of São Paulo i Brazil. He has written unpublished books for other undergraduate disciplines that he teache including signals and systems and digital signal processing.

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