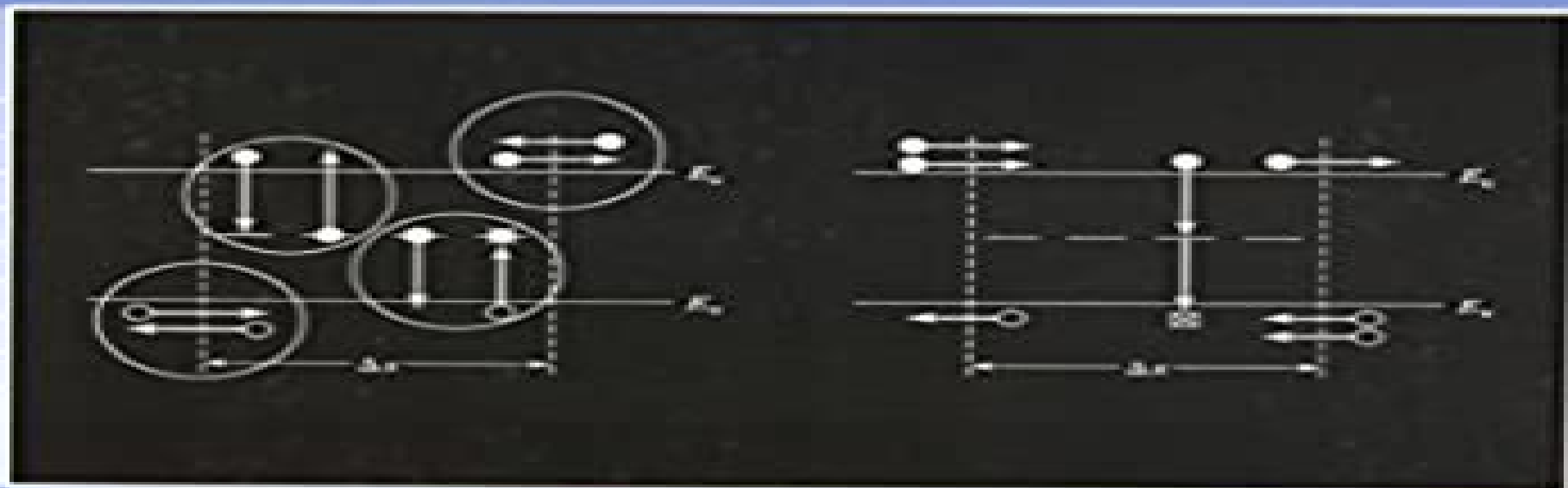


VOLUME VI

ADVANCED SEMICONDUCTOR FUNDAMENTALS

SECOND EDITION

ROBERT F. PIERRET



Modular Series on Solid State Devices
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Advanced Semiconductor Fundamentals 2nd Edition

Robert R. Redfield



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Parameter-Centric Scaled FET Devices Nabil Shovon Ashraf, 2025-03-26 Parameters that determine the performance of silicon based Field Effect Transistors FET devices in the presence of degenerate doping often are not modeled properly and so require precise analysis to improve modeling accuracy The book is focused on the extraction of parameters for silicon based FET models that critically determine the FET performance at room temperature as well as at very low temperatures Emphasis is put on analysis that is based on the device physics especially at low cryogenic temperatures Performance of gate all around GAA nanowire FETs and stacked nanosheet complementary FETs C FET are also discussed

Fundamentals Of Nanotransistors Mark S Lundstrom, 2017-07-11 The transistor is the key enabler of modern electronics Progress in transistor scaling has pushed channel lengths to the nanometer regime where traditional approaches to device physics are less and less suitable These lectures describe a way of understanding MOSFETs and other transistors that is much more

suitable than traditional approaches when the critical dimensions are measured in nanometers. It uses a novel bottom up approach that agrees with traditional methods when devices are large but that also works for nano devices. Surprisingly the final result looks much like the traditional textbook transistor models but the parameters in the equations have simple clear interpretations at the nanoscale. The objective is to provide readers with an understanding of the essential physics of nanoscale transistors as well as some of the practical technological considerations and fundamental limits. This book is written in a way that is broadly accessible to students with only a very basic knowledge of semiconductor physics and electronic circuits.

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Physics of Semiconductors Core Principles is a comprehensive guide that demystifies how semiconductors function from the fundamental physics to the devices we use daily. We cater to a general audience with a focus on readers in the United States. We begin with the basics of quantum mechanics and solid state physics before diving into how these principles apply to semiconductors like silicon and gallium arsenide. We explain crucial concepts such as band theory, the flow of electricity through semiconductors, and their use in devices like transistors and solar cells. Additionally, we discuss the manufacturing processes of semiconductors and highlight the advancements scientists are making in developing new and improved semiconductors.

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