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modern VLSI  
devices, as well  
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pendencies and  
subtle trade-offs  
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device  
parameters, and  
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and bipolar  
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*Equations and  
parameters*

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*provided are  
checked  
continuously  
against the*

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data, making  
the book equally  
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transistor design  
and in the  
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latest  
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microwave, and  
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devices. It*

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provides the  
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particularly  
useful for those  
beginning work  
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semiconductors  
devices, lasers,*

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important in  
everyday solid-  
state physics  
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alloys, strain,  
heterostructures  
,  
nanostructures,  
amorphous  
semiconductors,  
and noise, which  
are essential*

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and transparent  
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to facilitate a  
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researchers as  
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*Fundamentals of  
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the physics of operation of power semiconductor devices that are commonly used by the power electronics industry. Analytical models for explaining the operation of all power semiconductor devices are shown. The treatment here focuses on silicon devices but includes

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the unique attributes and design requirements for emerging silicon carbide devices. The book will appeal to practicing engineers in the power semiconductor device community.

This book covers the physics of semiconductors on an introductory level,



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assuming that the reader already has some knowledge of condensed matter physics. Crystal structure, band structure, carrier transport, phonons, scattering processes and optical properties are presented for typical semiconductors such as silicon, but III-V

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major bipolar,  
unipolar, special  
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updated and  
expanded edition

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approximately 1,000  
references to original  
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than 650 high-quality  
technical illustrations,  
and over two dozen  
tables of material  
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into five parts, the text first provides a summary of semiconductor properties, covering energy band, carrier concentration, and transport properties. The second part surveys the basic building blocks of semiconductor devices, including p-n junctions, metal-

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semiconductor  
contacts, and metal-insulator-  
semiconductor (MIS)  
capacitors. Part III  
examines bipolar  
transistors, MOSFETs  
(MOS field-effect  
transistors), and  
other field-effect  
transistors such as  
JFETs (junction field-  
effect-transistors)  
and MESFETs (metal-

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semiconductor field-effect transistors).

Part IV focuses on negative-resistance and power devices. The book concludes with coverage of photonic devices and sensors, including light-emitting diodes (LEDs), solar cells, and various photodetectors and semiconductor

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sensors. This classic volume, the standard textbook and reference in the field of semiconductor devices: Provides the practical foundation necessary for understanding the devices currently in use and evaluating the performance and limitations of future devices Offers



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and revised  
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reflects advances in  
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performance, and  
application Features  
discussions of topics  
of contemporary  
interest, such as  
applications of  
photonic devices that  
convert optical  
energy to electric

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numerous problem  
sets, real-world  
examples, tables,  
figures, and  
illustrations; several  
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solutions manual for  
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technologies such as  
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been thoroughly  
revised and updated.  
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interfaces. The unifying concept is the continuum of interface-induced gap states.

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*This book provides  
an overview of  
compound  
semiconductor  
materials and their  
technology. After  
presenting a*

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*theoretical background, it describes the relevant material preparation technologies for bulk and thin-layer epitaxial growth. It then briefly discusses the electrical, optical, and structural*

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*properties of  
semiconductors,  
complemented by a  
description of the  
most popular  
characterization  
tools, before more  
complex hetero- and  
low-dimensional  
structures are  
discussed. A special  
chapter is devoted to*



*GaN and related materials, owing to their huge importance in modern optoelectronic and electronic devices, on the one hand, and their particular properties compared to other compound semiconductors, on*

*the other. In the last part of the book, the physics and functionality of optoelectronic and electronic device structures (LEDs, laser diodes, solar cells, field-effect and heterojunction bipolar transistors) are discussed on the*

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*basis of the specific  
properties of  
compound  
semiconductors  
presented in the  
preceding chapters  
of the book.*

*Compound  
semiconductors  
form the back-bone  
of all opto-  
electronic and*

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*electronic devices  
besides the classical  
Si electronics.*

*Currently the most  
important field is  
solid state lighting  
with highly  
efficient LEDs  
emitting visible  
light. Also laser  
diodes of all  
wavelength ranges*

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*between mid-infrared and near ultraviolet have been the enabler for a huge number of unprecedented applications like CDs and DVDs for entertainment and data storage, not to speak about the internet, which*

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without optical data  
communications  
with infrared laser  
diodes as key  
elements. This book  
provides a concise  
overview over this  
class of materials,  
including the most  
important  
technological*

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*aspects for their  
fabrication and  
characterisation,  
also covering the  
most relevant  
devices based on  
compound  
semiconductors. It  
presents therefore  
an excellent  
introduction into  
this subject not only*

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also for engineers  
and scientist who  
intend to put their  
focus on this field  
of science.*

*Excellent bridge  
between general  
solid-state physics  
textbook and  
research articles  
packed with*



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explanations of the  
electronic,  
vibrational,  
transport, and  
optical properties of  
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*"The most striking  
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is its modern outlook  
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center known as the  
DX center,  
additional problems  
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This text aims  
to provide the  
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