



# Semiconductor Optoelectronic Devices: Introduction to Physics and Simulation

*Joachim Piprek*

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## **Semiconductor Optoelectronic Devices: Introduction to Physics and Simulation** Joachim Piprek

Optoelectronics has become an important part of our lives. Wherever light is used to transmit information, tiny semiconductor devices are needed to transfer electrical current into optical signals and vice versa. Examples include light emitting diodes in radios and other appliances, photodetectors in elevator doors and digital cameras, and laser diodes that transmit phone calls through glass fibers. Such optoelectronic devices take advantage of sophisticated interactions between electrons and light. Nanometer scale semiconductor structures are often at the heart of modern optoelectronic devices. Their shrinking size and increasing complexity make computer simulation an important tool to design better devices that meet ever rising performance requirements. The current need to apply advanced design software in optoelectronics follows the trend observed in the 1980's with simulation software for silicon devices. Today, software for technology computer-aided design (TCAD) and electronic design automation (EDA) represents a fundamental part of the silicon industry. In optoelectronics, advanced commercial device software has emerged recently and it is expected to play an increasingly important role in the near future. This book will enable students, device engineers, and researchers to more effectively use advanced design software in optoelectronics.

- \* Provides fundamental knowledge in semiconductor physics and in electromagnetics, while helping to understand and use advanced device simulation software
- \* Demonstrates the combination of measurements and simulations in order to obtain realistic results and provides data on all required material parameters
- \* Gives deep insight into the physics of state-of-the-art devices and helps to design and analyze of modern optoelectronic devices

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