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Gallium Nitride (GaN): Physics, Devices, and Technology (Devices, Circuits, and Systems)

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Addresses a Growing Need for High-Power and High-Frequency Transistors

Gallium Nitride (GaN): Physics, Devices, and Technology offers a balanced perspective on the state of the art in gallium nitride technology. A semiconductor commonly used in bright light-emitting diodes, GaN can serve as a great alternative to existing devices used in microelectronics. It has a wide band gap and high electron mobility that gives it special properties for applications in optoelectronic, high-power, and high-frequency devices, and because of its high off-state breakdown strength combined with excellent on-state channel conductivity, GaN is an ideal candidate for switching power transistors.

Explores Recent Progress in High-Frequency GaN Technology

Written by a panel of academic and industry experts from around the globe, this book reviews the advantages of GaN-based material systems suitable for high-frequency, high-power applications. It provides an overview of the semiconductor environment, outlines the fundamental device physics of GaN, and describes GaN materials and device structures that are needed for the next stage of microelectronics and optoelectronics. The book details the development of radio frequency (RF) semiconductor devices and circuits, considers the current challenges that the industry now faces, and examines future trends.

In addition, the authors:

- Propose a design in which multiple LED stacks can be connected in a series using interband tunnel junction (TJ) interconnects
- Examine GaN technology while in its early stages of high-volume deployment in commercial and military products
- Consider the potential use of both sunlight and hydrogen as promising and prominent energy sources for this technology
- Introduce two unique methods, PEC oxidation and vapor cooling condensation methods, for the deposition of high-quality oxide layers

A single-source reference for students and professionals, **Gallium Nitride (GaN): Physics, Devices, and Technology** provides an overall assessment of the semiconductor environment, discusses the potential use of GaN-based technology for RF semiconductor devices, and highlights the current and emerging applications of GaN.

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