



# Carbon Nanotube and Graphene Nanoribbon Interconnects

*Debaprasad Das, Hafizur Rahaman*

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An Alternative to Copper-Based Interconnect Technology

With an increase in demand for more circuit components on a single chip, there is a growing need for nanoelectronic devices and their interconnects (a physical connecting medium made of thin metal films between several electrical nodes in a semiconducting chip that transmit signals from one point to another without any distortion). **Carbon Nanotube and Graphene Nanoribbon Interconnects** explores two new important carbon nanomaterials, carbon nanotube (CNT) and graphene nanoribbon (GNR), and compares them with that of copper-based interconnects. These nanomaterials show almost 1,000 times more current-carrying capacity and significantly higher mean free path than copper. Due to their remarkable properties, CNT and GNR could soon replace traditional copper interconnects. Dedicated to proving their benefits, this book covers the basic theory of CNT and GNR, and provides a comprehensive analysis of the CNT- and GNR-based VLSI interconnects at nanometric dimensions.

Explore the Potential Applications of CNT and Graphene for VLSI Circuits

The book starts off with a brief introduction of carbon nanomaterials, discusses the latest research, and details the modeling and analysis of CNT and GNR interconnects. It also describes the electrical, thermal, and mechanical properties, and structural behavior of these materials. In addition, it chronicles the progression of these fundamental properties, explores possible engineering applications and growth technologies, and considers applications for CNT and GNR apart from their use in VLSI circuits.

Comprising eight chapters this text:

- Covers the basics of carbon nanotube and graphene nanoribbon
- Discusses the growth and characterization of carbon nanotube and graphene nanoribbon
- Presents the modeling of CNT and GNR as future VLSI interconnects
- Examines the applicability of CNT and GNR in terms of several analysis works
- Addresses the timing and frequency response of the CNT and GNR interconnects
- Explores the signal integrity analysis for CNT and GNR interconnects
- Models and analyzes the applicability of CNT and GNR as power interconnects
- Considers the future scope of CNT and GNR

Beneficial to VLSI designers working in this area, **Carbon Nanotube and Graphene Nanoribbon Interconnects** provides a complete understanding of carbon-based materials and interconnect technology, and equips the reader with sufficient knowledge about the future scope of research and development for this emerging topic.



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