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V. K. Jain • Abhishek Verma  
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# Physics of Semiconductor Devices

17th International Workshop on the Physics  
of Semiconductor Devices 2013

 Springer

*Editors*

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## Preface

Science and technology of twenty-first century is relying heavily on the development of new materials and their structures. In which the technology of semiconductors is the foundation of modern electronics, including transistors, solar cells, light-emitting diodes (LEDs), quantum dots, and digital and analog integrated circuits. The various fields of semiconductor have continued to prosper and to break new ground. This development has been so fast and may even impact our environment, like by decreasing the amount of fossil fuel used to produce electricity. Therefore, any sort of updated research, latest findings in the area related to semiconductor must be important to all scientific community. The history of the understanding of semiconductors begin with experiments on electrical properties of materials. The properties of negative temperature coefficient of resistance, rectification, and light sensitivity were observed in the early nineteenth century. Since then, a wide variety of techniques were used and discovered to analyze the properties of semiconductors, more than 300 billion dollar sector of the world's economy that designs and manufactures semiconductor devices and many Nobel Prizes have been given in the field of semiconductors. Still, all over the world very intensive work is going on different technologies based on thrust areas of this workshop, and it is essential to keep abreast with the latest developments in advanced fabrication techniques, characterization tools, and also in understanding the physics to enable and produce reliable large volume production of state-of-the-art devices.

About the futuristic optoelectronics, it can be quoted the T. Hiruma's vision that "detecting a single photon cannot be the end point. It is just a starting point. Human kind doesn't know enough even in photonics. We have to find our own direction. God of absolute truth. In-fact we are able to detect a single photon now using a low noise detectors. We have been measuring light from the human body. The body emits about 100 photons per second. His question at the moment is how to measure wavelength and polarity of this light. The purpose is to explore way to apply these photon technologies to study biology and brain."

Now, it's an era of nanotechnology, which can be regarded as the major technological challenge of this century that is stirring people's imagination about its potential use. A new era has already begun, which is changing people's way of life, thinking, and behavior in a very deep manner. Nano scientists can even manipulate objects and forces at the nano scale. At this size, matter behaves differently, light and electricity resolve into individual photons and electrons, particles pop in and out of existence, and other once theoretical oddities of quantum mechanics are seen to be real. Therefore, to give a full exposure and new platform to young scientists and researchers, along with face-to-face discussion with top scientists of particular area, this type of International workshop will highly be beneficial.

The book *Physics of Semiconductor Devices* comprises of scientific contributions from different veins of semiconductor materials, devices, and the related technologies. The

contribution has been made by different researchers and eminent scientist from all over the world who presented their paper in the seventeenth International Workshop on the Physics of Semiconductor Devices, 2013 organized by Amity University, Noida. The purpose and objective of this meeting is to spread the vast knowledge of semiconductor physics in every possible field for academia and industry. Through this, every latest finding, research and discovery can go ahead to our scientific world. The chapters include various latest and significant topics, i.e., Optoelectronics, VLSI and ULSI Technology, Photovoltaics, MEMS and Sensors, Device Modeling and Simulation, High Frequency/Power Devices, Nanotechnology and Emerging Areas, Display and Lighting, and Organic Electronics.

The editors wish to place on record our appreciation to Dr. Ashok K. Chauhan, Founder President, Amity University, Noida for his encouragement. Our sincere gratitude goes to Dr. Prashant Shukla, Dr. Abhishek Kardam, Dr. S. S. Narayanan, Dr. Devinder Madhwal, and all the members of seventeenth International Workshop on the Physics of Semiconductor Devices, 2013 for their help in organizing this workshop.

V. K. Jain  
Abhishek Verma

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