Editor's Note

The present volume "Nanomaterials: Basic Concepts and Applications", as the title suggests, deals with basic concepts and applications of nanomaterials, a buzz word in the modern world of Science and Technology. Because of advanced characterization and new fabrication techniques, nanomaterials are now central to multiple disciplines, including materials science, chemistry, physics, engineering and medicine. This special volume under Solid State Phenomena series will present an overview of recent research developments, including synthesis, characterization and applications in Nanoelectronics, Luminescence, Drug Delivery, Memristors, Solar Cells and Semiconductors.

There are 8 Chapters in this volume. First Chapter: "Luminescence of II-VI Semiconductor Nanoparticles" is the longest chapter in this volume. Luminescence of II-VI semiconductor nanoparticles such as ZnS, CdS, ZnO, etc. has attracted a lot of attention in the last two decades due to their unique properties and potential applications in electronics, lighting industry, displays, DNA markers and other medical fields. In the present chapter, the history, preparation, characterization, and optical absorption of nanoparticles are discussed in great detail; and the challenges and applications of the luminescence of semiconductor nanoparticles are explored. It is believed that the systematic investigation of a 'synthesis-property-application' triangle for the nanoparticles will inspire more research activities to solve the current challenges and promote deep curiosity and intense interest in the study of inorganic semiconducting nanoparticles.

Second Chapter "Oxide Nanomaterials and their Applications as a Memristor" outlines the unique properties, synthesis techniques and applications of oxide nanomaterials. The important and unique properties of TiO_2 and ZnO nanomaterials with their possible crystal structures have been discussed. In application part, the oxide nanomaterials, especially ZnO has been discussed for memory device applications. Oxide nanomaterials find application in memristor device application, which are becoming the hotspots in the field of physics, electronics as well as materials.

Third Chapter "Nano Electronics: A New Era of Devices" is a noteworthy contribution by Biomolecular Electronics and Nanotechnology Division (BEND) Group of CSIO, Chandigarh. Many molecules show interesting electronic properties, which make them probable candidates for electronic device applications. The challenge is to interpret their electronic properties at nanoscale so as to exploit them for use in new generation electronic devices. The authors

look around for alternative materials, for example, organic molecules, proteins, carbon materials, and DNA, for electronic device application and new methods for electronic device fabrication.

Fourth Chapter "Progress in Plasmonic Enhanced Bulk Heterojunction Organic/Polymer Solar Cells" discusses the enormous potential of thin-film photovoltaic technologies. Organic/polymer solar cells have many intrinsic advantages, such as their light weight, flexibility, and low material and manufacturing costs. This Chapter reviews the different plasmonic effects occurring due to the incorporation of metallic nanoparticles in the polymer solar cell. It is shown that a careful choice of size, concentration and location of plasmonic metallic nanoparticles in the device result in an enhancement of the power conversion efficiencies, when compared to standard organic solar cell devices.

Chapters 5 and 6 review an important application of Carbon nanotubes and potential of nanomaterials, respectively, as drug delivery vehicles to treat cancer and other maladies effectively. Carbon nanotubes are enjoying increasing popularity as building blocks for novel drug delivery systems as well as for bioimaging and biosensing. The recent strategies to functionalize carbon nanotubes have resulted in the generation of biocompatible and water-soluble carbon nanotubes that are well suited for high treatment efficacy and minimum side effects for future cancer therapies with low drug doses. Currently a number of nanomaterials are under investigation for their suitability as sustained, controlled and targeted drug carriers. However, authors of Chapter 6 confine their discussion to lipidic and polymeric nanomaterials, the two most commonly promoted, and safe nanosystems for delivery of both the chemical or small molecular entities (SME) and the macromolecules including genes and siRNA.

Chapter 7 is a research paper based on "Photoluminescence in a Novel Aldo-Keto Synthesized $YPO_4:Eu^{3+}$ Nanophosphor". The luminescence studies were carried out by photoluminescence (PL) spectroscopy. The PL spectra reveal that the orange emission ($^5D_0 \rightarrow {}^7F_1$) was more intense than a normal red emission ($^5D_0 \rightarrow {}^7F_2$). Chapter 8 "Recent Advances in the Synthesis and Characterization of Chalcogenide Nanoparticles" discusses in detail the synthesis strategies of size and shape controlled nanoparticles belonging to II-VI group of semiconductor chalcogenides. Nanoparticles and self-assemblies of CdSe, CdTe, HgTe and ZnSe are synthesized and characterized using new and facile single source molecular precursors based noble route by the authors. Some recent applications of chalcogenides QDs in the fields of solar cell, optical fibre amplifiers, biosensing and bo-imaging are discussed in this Chapter.

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