

Preface

The emerging development in the field of materials and devices are some of the most important factors in driving the growth of a nation's economy because of its potential contribution to manufacturing processes and innovative products. It is heartening to see that how during the past few years, the niches for research in the area of material science and technologies have multiplied exponentially and how the material scientists are contributing to global progress in the field.

The conference was organized with the aim to provide a common forum for eminent scientists, technologists, entrepreneurs, and scholars from various disciplines to present their work and discuss the latest advances and innovations in this exciting area of research. Materials science remains intrinsically interdisciplinary and the integration of different disciplines of sciences and outcome of R&D efforts from laboratory to practical devices was one of the focal themes of this conference wherein our faculty and students were exposed to the latest advancements in these fields. The conference provided an opportunity for the participants to interact and develop collaborative partnership.

The Book "*Recent Trends in Materials and Devices*" comprises of scientific contributions from different veins of semiconductors, composites, polymeric materials, devices, and the other related technologies. The contributions have been made by different researchers and eminent scientist from all over the world, who presented their papers in this International Conference on the Recent Trends in Materials and Devices, 2015. In view of the great efforts and initiative of the Government of India, especially the "Make in India" program, most of the NRI & PIO scientists, academicians, and technocrats are willing to help our country especially in research & development in the area of materials and devices leading to product development and production. The chapters include various latest and significant topics i.e. *Semiconductor Materials and Devices, Smart Materials, Polymeric Materials, Sensors, Photovoltaics and Energy Storage, Optoelectronics, Nanotechnology and Nanomaterials, MEMS and NEMS, and Emerging Technologies*.

Part I of the book gives the cutting-edge technologies in the field of *Nanotechnology and Nanomaterials*. It includes the latest findings of eminent

scientists discussing the thermal characterization of SWCNT and tungsten oxide-based nanomaterials; Carbon the future of nanomaterials; antireflection properties of nanoparticles assist black silicon for 3rd generation solar cells; dye removal using nanocellulose; thermos-physical properties of nanoparticle-enhanced phase change materials for thermal energy storage; silicone nanowire based transistors; surface engineering of colloidal quantum dots; graphene nanoballs; water splitting; nanocomposites; nanomaterial based sensors; and a lots more. The latest work in the field of *Optoelectronics* is compiled in Part II, such as structural and optical properties of single crystalline cerium-doped ZnO thin films; tailoring the band structures of GaSb and $\text{InP}_{1-x}\text{Bi}_x$ for LASERS, photodetectors, etc.; efficient metal clad optical waveguide polarizer. Part III includes the pioneering and front-line outcomes in the arena of *Photovoltaics and Energy Storage*, from the research work of various eminent scientists and young researchers. The contributions comprises of effect of silver nanoparticles as surface plasmonic layer to enhance efficiency of 3rd generation solar cells; graded index antireflection coating for efficient solar cells; dye-sensitized solar cells; photonic crystals as reflection and diffraction gratings for light trapping; synthesis of $\text{Cu}_2\text{ZnSnS}_4$ (CZTS); analysis of SnS nanolayer on ZnO nanowires; MWCNT for energy storage/conversion devices; etc. Part IV comprises the latest findings on *Sensors*, which includes the work such as Lossy Mode Resonance Sensor; Dual Dielectric p-MOSFET as Cumulative Gamma Dose Sensor. The contributions in the trust area of *Polymeric Materials* are discussed in Part V, which contains polymer nanocomposite films for energy storage applications; polymer separator for energy storage devices; efficient nanofiller embedded polymeric films; polypropylene/glass fiber composites for low cost orthotic aid. Part VI includes *Semiconductor Materials and Devices*, where the latest observations have been discussed on properties of nanocrystalline PbS films; Synthesis and properties of inorganic organic chloride-based perovskite; design, simulation, and analysis of 4×1 Mux at 90 nm CMOS. Further, in Part VII the cutting-edge researches from various eminent scientists and young scholars have been reported. It includes the clean energy harvesting using rare-earth magnet and ferro-fluid; findings on nonvolatile memory device applications; strengthen properties of cast Cu–Al alloys processed by cryorolling; twist grain boundary phases in liquid crystals; capping-ligand effect on colloidal CIGSe nanocrystals for thin film solar cell applications; and more findings. In the last, Part VIII includes the latest outcomes of various *Emerging Technologies*, such as novel design of fractal antenna; Nematic liquid crystal; and Carbon nanotube FET-based inverter. These contributory papers were full of new scientific knowledge, thought provoking ideas, skills, brain storming discussions, and exchange of ideas. Through this, every latest findings and researches will go ahead to our scientific world.

We are sure that all the latest results and findings reported here will be useful to the young researchers and scientists working in these areas.

These conference-related papers and the rich scientific-knowledge exchanged the result from the efforts of a large team of people who volunteered their time to serve the ICRTMD conference. We are indebted to all of them for their assistance and support. It is not possible to thank all of these individuals, but we would

like to thank, on behalf of the ICRTMD 2015, a number of people who made particularly significant contributions.

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