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GUEST EDITORIAL

Emerging areas of Nano and Smart Materials

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'*There's plenty of room at the bottom*' – In 1959, one of the most brilliant physicists the world has ever seen, Richard P. Feynmann, gave us a beautiful introduction to nano-science. Today, after almost seven decades, nano-materials and related technologies are not just a simple extension of regular research and miniaturisation of materials, but have become the prime driver of advancement in science and technology all over the world. Over the past few decades, diverse societal requirement have emerged at the national and international level.

The emerging nanotechnologies, which harness the properties of materials at nano level, offer a wonderful way to meet these demands and requirements. Hence, nanomaterial research is being pursued with intense scientific fervour all over the world. It has been envisaged in many countries that nano-materials and related nano-technologies will revolutionise space, military and medical/pharmaceutical sectors besides having direct and indirect impact over a much broader spectrum of fields such as information technology, data storage, semi-conductor technology, sensors and actuators, explosives, chemical industries, aerospace, automotive industries, biomedical sciences and many more!

Sensing the pulse of the current focus in scientific research, the editorial team of *Defence Science Journal* has decided to bring out a special issue with critical reviews and original research papers in the emerging areas of nano and smart materials. I believe that the papers published in this issue provide cutting edge information related to various nanotechnologies. Further, I hope the exciting nano science discussed in this issue will provide research guidance and inspiration to a new generation of researchers, and will motivate them to take up challenging research topics in nanomaterials and related areas.

Defence Research and Development Organisation (DRDO) India has a mandate to develop and use newer materials, devices and components in the wide range of systems that are being developed in its laboratories. There are several processes to create nano-materials and smart materials that can be further classified as top-down and bottom-up approaches. Although many nano-materials currently under laboratory trials at DRDO are on the verge of industrial commercialisation, we feel, it is the right time to bring forward the current scientific understanding about these nanomaterials through this special issue.

The Editorial team has worked hard to collect technical papers dealing with multi-scale and multi-functional materials ranging from metals, alloys, ceramics, oxides, composites, polymers and semiconductors, all leading to component level technologies. In this special issue, we have addressed different types of nano particles, nano-tubes, nano-rods, nano-crystals, nano-wires, nano-composites, nano-fillers, nano-fibers, nano-oxides and related smart materials with detailed key components of a research system-processing and characterisation methods.

I would like to take this opportunity to express my gratitude to the authors, all renowned experts in their respective fields, who have readily agreed to contribute to this Special Issue.

I hope you all will enjoy and benefit from reading this rich collection of articles and papers in this Journal. I hope you benefit from reading the rich collection of articles in this issue and find them intellectually stimulating!

About Guest Editor

Dr Partha Ghosal has received his PhD (Metallurgical Engineering) from Indian Institute of Technology, Banaras Hindu University, in 1996. He has around 80 research papers, over 100 invited presentations, and 3 patents to his credit. His current interests include: *In-situ* mechanical testing and heating experiments of nano and advanced materials inside electron microscopes and advanced Raman analysis for these materials. Did extensive electron microscopic works on Ti base alloys, W based alloys and nano composites.