PREFACE

We are pleased to present a special issue of the Indian Journal of Engineering and Materials Sciences on *Materials and Manufacturing Processes*. This special issue is a part of the papers selected from The International Conference on Materials Processing and Characterization (ICMPC 2022), organised by Gokaraju Rangaraju Institute of Engineering and Technology (GRIET), Bachupally, Hyderabad, Telangana, during 22-24 April, 2022.

Functional materials, smart materials, intelligent materials – whatever you call them, they will be a key pillar of 21st century technology. Among the modern structural materials there has been a tremendous advancement in science and technology of materials. In recent years, nanostructure materials and nano composites have become increasingly important because of their remarkable properties and permanently growing areas for practical applications. Various aspects of mechanical properties of nano materials including analytical and computational modelling in combination with comprehensive experimental analysis of mechanical behaviour is yet to be investigated. Despite the rapid progress in this field, mechanical properties of nano materials and composites are still remaining terra incognita in materials science. In the field of massive and complex manufacturing we are now in need of materials, with properties, that can be manipulated according to our needs.

Large spaceplanes like the Space Shuttle would have proven extremely difficult, if not impossible, to build without heat-resistant ceramic tiles to protect them during re-entry. And high-speed forward-swept-wing airplanes like Grumman's experimental X-29 or the Russian Sukhoi S-27 Berkut would not have been possible without the development of composite materials to keep their wings from bending out of shape. Nature is full of magic materials, which are to be discovered in forms suitable to our needs. Such magical materials, also known as intelligent or smart materials, can sense, process, stimulate and actuate a response.

There is an increasing awareness of the benefits to be derived from the development and exploitation of advanced materials and structures in applications ranging from hydrospace to aerospace. With the ability to respond autonomously to changes in their environment, smart systems can offer a simplified approach to the control of various material and system characteristics. Mechanistic understanding from any discipline is the routes to the development of materials with capabilities beyond those currently available.

The conference is creating a cross disciplinary summit that transcends departmental, institutional, industrial, public and private research organizations and global barriers and lends itself to the integration of research and education in the vital field of advanced materials. This conference is mainly aims in major sectors of advanced processing, material characterization, modeling and simulation, properties, performance and device fabrication.

This special issue of Indian Journal of Engineering and Materials Sciences (IJEMS) contains 19 selected and peer reviewed papers, both from academia and user industries. The special issue covers papers on upcoming topics like additive manufacturing; materials behaviour; materials processing and characterization; modeling and simulation etc. Despite being just a small part of the program, the papers in the special issue undoubtedly enhance our understanding on the basic science, engineering and development of process technologies related to materials.

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Guest Editors:
Prof. (Dr.) Swadesh Kumar Singh, GRIET, Hyderabad, India
Prof. (Dr.) Kuldeep K. Saxena, Lovely Professional University, India