Advances in Materials Science and Engineering

Hindawi

Special Issue on

Microscopic Techniques in Material Science: Current Trends in the Area of Blends, Composites, and Hybrid Materials

CALL FOR PAPERS

Microscopic techniques make it possible to assess the morphology, composition, physical properties, and dynamic behavior of materials, thus making a significant contribution to the development of material science. They are necessary for both the quality control of products and the development of new materials. Research on the design, synthesis, characterization, and development of useful innovative, technologically advanced, adaptable, and multifunctional materials and devices with lower mass, smaller volume, higher efficiency, and lower cost, in particular novel materials and structures, are rapidly growing fields of materials science. Advanced blends, composites, and hybrid materials are the most-developing classes of new materials that lead to numerous technological innovations. Knowledge on the relationships between structure, properties, functions, and performance is essential for prospective safe applications of such materials in the areas of human health and the environment. The study of the physical and technical foundation of the latest developments in the areas described will be based on microscopic techniques that are also used in a variety of industrial applications, including topographic and dynamical surface studies of many materials.

The purpose of this special issue is to present a contemporary overview of latest developments in the field of advanced blends, composites, and hybrid materials, in particular the latest breakthroughs and approaches in the science of those materials leading to the development of the new generation of multifunctional materials with enhanced features and improved properties for the production of high-performance systems and devices using microscopic techniques. Reviews and research articles, covering the aspects of the current trends in expansion of such materials, are all welcome.

Potential topics include but are not limited to the following:

- Blends, composites, and hybrid materials for the sustainable future
- Materials based on natural, renewable, and synthetic polymers
- Methods of recycling, properties, and applications of recycled ceramic, glass, silica, and carbon materials
- Metals and alloys, intermetallic composites, magnetic materials, ionic crystals, covalent crystals, coatings, films, foils, and pigments for advanced applications
- Functional materials with application in automotive and transportation industry, aeronautics and space industry, energy, engineering, and environmental sectors
- New application in agriculture and horticulture sector, packaging, and food-service sectors
- Applications of blends, composites, and hybrid materials in the areas of human health and the environment
- Blends, composites, and hybrid materials in medical, pharmaceutical, and dental industry
- Relationships between structure, properties, functions, and performance of blends, composites, and hybrid materials
- Topographic and dynamical surface studies of blends, composites, and hybrid materials
- Fundamental and applied research in emerging application areas in nanotechnology, interfacial science, and engineering, advanced manufacturing, catalysis, bioengineering, bioinspired synthesis, green production routes, sensing, and actuation
- Synthesis, design, characterization, and development of useful innovative, technologically advanced, adaptable, and multifunctional materials
- Novel materials and devices with lower mass, smaller volume, higher efficiency, and lower cost
- Latest breakthroughs and approaches in the material science
- Microscopic techniques such as optical microscopy (conventional light microscopy (LM), fluorescence microscopy (FM), confocal/multiphoton microscopy, and stimulated emission depletion microscopy (STED)), scanning probe microscopy (scanning tunneling microscopy (STM), atomic force microscopy (AFM), near-field scanning optical microscopy, and others), and electron microscopy (scanning electron microscopy (SEM), transmission electron microscopy (TEM), scanning transmission electron microscopy (STEM), focus ion beam microscopy (FIB)) in material science
- A new generation of multifunctional materials with enhanced features and improved properties for high-performance systems and devices developed using microscopic techniques

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