



Preface

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A path for creating an advanced society is being paved with nanotechnology, which is a transformational path for Industry 4.0. It contributes benefits in many important domains, including medicine, energy, environmental protection, construction, etc. Advances in nanoscience increase our knowledge of materials on a smaller scale, particularly their fundamental physical, chemical, and biological properties that differ from their aggregate forms. Scientists and engineers will manufacture next-generation materials for a better future by understanding of these nanoscale properties. In this special issue of Emergent Materials journal entitled “Women in Nanotechnology,” we emphasize the work of research groups run by women scientists worldwide.

Building scientific capacity is a shared responsibility. Therefore, women’s contributions and efforts should be highlighted. The presence of women in science spans the earliest times of the history of science, wherein they have made significant contributions. Currently, women are pioneers in the fields of science and technology. There is an increase in their enrolment in the scientific field. The contribution of women in science and technology is important in enriching society. Still, through their effective participation in these fields, they promote the community’s well-being. Work led by female investigators continues to increase, and we aim to introduce some of those exciting nanotechnology projects. The main areas that have been taken into account in this special issue include a broad range of topics, including smart nanomaterials, sensors, nanotechnology for

environmental management and water security, renewable energy, and nanomaterials for health applications; it also includes different technical approaches from fabrication, property enhancement of applications, and device improvement. These are some examples of enthralling research in nanoscience and nanotechnology.

The review article by Jesiya et al. presents an overview of current advancements in bio-based thermosetting polymers. Biosource monomers and crosslinking agents for thermosetting polymers have been discussed and compared with conventional resins. A final outlook of such promising biobased thermosets is provided to satisfy society’s need for sustainability. Research findings from Basri et al. provided a framework for designing and optimizing optoelectronic applications based on ZnO ultrathin films. An investigation of the synthesis, mechanical properties, and microstructure of BNNT-Al dual matrix composite is presented by Kirolos et al.

Ayesha Kausar’s review of fullerenes and polymer nanocomposites highlights several essential aspects, emphasizing on high-performance coatings. Furthermore, the functional properties and prospects of high-performance nanocomposite coatings have been summarized regarding the emerging area of fullerene-based nanocomposite technology, including photovoltaics, supercapacitors, fuel cells, batteries, sensors, etc. An article by Way et al. shows nanosized cerium oxide films’ structural and electrical properties. An overview of the various approaches in fabricating flexible tactile sensors using AgNWs is provided in the review article by Lei et al. Key performance parameters and working principles are also briefly discussed. The challenges and possibilities of developing Ag NW-based flexible sensors are also discussed.

Ridwan et al. investigated the temperature-dependent frequency shifts of the Raman-active and 1 g modes of multilayer molybdenum disulfide. The study established a strong foundation for future innovations in solution-processed 2D inorganic semiconductors by creating an integrated inkjet-printed heterostructure photodetector on flexible substrates. A new environmentally friendly and cost-effective method for removing phenolic compounds from olive mill

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wastewater has been described by Fadwa et al. by using magnetic nanoparticles in conjunction with a sorbent material such as Zeolite. Tetiana et al. describe the green synthesis of cobalt ferrite using grape extract and the impact of the cation distribution and inversion degree on its catalytic activities in decomposing hydrogen peroxide.

Deniz et al. contributed to this special issue with a review article on nanotechnology in food and water security: on-site detection of agricultural pollutants through surface-enhanced Raman spectroscopy, considering the increasing hazards to human health and the environment posed by microplastics and nanoparticles, the study focuses on these substances. Prof. Marta describes the preparation and use of iron nanomaterials to treat pollutants in water and soil. The article by Anis et al. discusses the hydrothermal synthesis of nitrogen-doped graphene quantum dots to detect mercury ions in an aqueous solution. Naznin et al. describe electrospun nanofiber composite membranes based on cellulose acetate/nano-zeolite to remove oil from oily wastewater. This study uses cellulose acetate (CA) and nano-zeolites to fabricate and evaluate electrospun membranes. Fatima et al. explain nanolayered double hydroxides' structural and morphological investigations as effective adsorbents for methyl orange. This study aims to synthesize a new series of nanolayered double hydroxides consisting of zinc, cobalt, aluminum, and iron and investigate the influence of the composition (Zn^{2+} , Co^{2+}) on the LDH structure.

A study by Moulouda et al. describes the application of FTIR and chemometrics to verify walnut oil authenticity. This study identifies and evaluates the adulteration in nut oils that can cause health and food hazards. Anwar et al. investigate the potential applications of oxidized cellulose nanostructures (CNS) obtained from wood pulp. This study uses an oxidized CNS to draw out methylene blue from aqueous solutions at various contact times, temperatures, and initial

dye concentrations. Hydrogen evolution by electrochemical processes is an important research field in renewable energy production. Shwetharani et al. explain functionalized 2D materials F-MoS₂ and F-g-C₃N₄ with TiO₂ as heterostructure electrocatalysts for electrochemical hydrogen evolution. Using the first principle method based on the plane-wave pseudopotential calculations and the local density approximation (LDA), Fatima et al. have investigated some basic fundamental properties of CaVO₃ and LaVO₃ promising cubic perovskites. To implement small-size spacecraft applications. Ghaida et al. investigated environmentally friendly propellants that are hypergolic and have similar performance levels to those of traditionally storable propellants. Energy harvesters are a promising option for self-powered devices. The piezoelectric fiber mats produced by Yu et al. could be used as electrical generators and stored in capacitors. Pinar et al. present recent advances in the use of nanoscale agents to prepare nanocomposites and to develop controlled delivery platforms by using nanoparticles, with a special focus on 3D-printed bone tissue engineering applications.

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