Preface

Nanomaterials are a class of materials ranging in size from 1 to 100 nm. They have received much attention in academic research and industrial sectors due to their inherent distinct characteristics and properties. The smaller size and the high surface-to-volume ratio of these materials results in exciting and exceptional properties that are not available in their conventional macroscopic/bulk counterparts. Nanomaterials and nanotechnology are a key area of research and their properties are being explored widely in various laboratories and industrial sectors. Nanomaterials have potential applications in diverse fields such as nanoelectronics, memory devices, optoelectronics, energy storage devices (lithium-ion batteries and supercapacitors), catalysis (photo-, chemical-, surface-), sensors (chemical and biomedical), paints and coatings (anti-corrosive, antibacterial, self-cleaning), nanomedicine, and even agriculture.

The chapters of this book are categorized in a logical manner from preparation to the characterization of nanomaterials for varied applications in energy storage, harvesting, sensing, environmental and biomedical applications, coatings, and the construction industry. This book covers advanced preparation methods for obtaining novel nanomaterials (such as graphene, carbon dots, zinc tin oxide, nanocellulose) and structural nanomaterials (hollow nanomaterials). It also summarizes the utilization of nanostructured materials and their composites towards supercapacitive energy storage and triboelectric energy harvesting sectors. A section is dedicated to biorecognition of nanomaterials in building advanced biosensors (fundamentals, dopamine detection, recognizing cancer biomarkers) using emerging nanostructured materials (2D siloxene and 2D MXene). Another section demonstrates the biological and environmental applications of nanomaterials such as green synthesis routes, antimicrobial activity, drug delivery, bone cement, and polysaccharide-based adsorbents for dye removal. The final section discusses the application of nanostructured materials in self-cleaning coatings and the construction industry.

As the editor of this book, I would like to express my sincere gratitude to the chapter authors for submitting their valuable research findings and previously published and presented review-based articles. This book is a useful resource for scientists working in the fields of interdisciplinary science and technology, experts in a variety of disciplines, both academic and industrial, as well as students.

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