

Preface

The field of materials science continues to expand and evolve at a rapid pace, driven by the increasing demands of modern technology, sustainability challenges, and the pursuit of higher performance across all sectors of industry. This special edition is prepared to provide a structured overview of cutting-edge developments and research in three key categories of materials: composites and polymers, structural metals, and functional materials with applications in electronics and energy.

Chapter 1: Advanced Composites and Polymers describes examples of the innovative applications of composite materials and high-performance polymers in various engineering and manufacturing contexts. With a focus on design, synthesis, and processing techniques, the chapter focuses also on topics such as fiber-reinforced polymers, nanocomposites, bio-based polymers, and methods for enhancing their mechanical, thermal, and environmental properties.

Chapter 2: Structural Metals examines the latest advancements in structural metallic materials, which remain essential to infrastructure, aerospace, automotive, and energy systems, etc. The discussion includes analysing features of aluminium alloy welding between each other and with steel and also the method of improving sliding wear of bearing steel using cellulose microparticles additive.

The third Chapter 3: Advanced Functional Materials for Electronics and Energy Applications addresses materials developed specifically for use in electronic devices and energy systems. It features topics such as semiconductors, superconducting materials, battery electrolytes, etc. The integration with device engineering is emphasized to highlight real-world and future directions of applications.

This special edition serves as a valuable resource for researchers and engineers, aiming to understand the latest trends in the development and application of advanced materials.