

# Preface

This special edition offers in-depth research on the properties of cutting-edge materials, the technologies of their synthesis and processing, and their diverse applications.

The first chapter explores structural metals such as steel, alloy, and gray iron. Mechanical properties, microstructure, regularities of martensitic transformations, specific features of alloy high-speed milling alloy, etc., are investigated here.

The second chapter focuses on the properties of various materials with biocomponents based on biomass from date palms and their synthesis technologies.

The next chapter examines the application of titanium alloys in the surgical treatment of posterior lumbar interbody fusion; design, processing, testing and characterising of orthodontics bio-nanocomposite as well as the effect of combinations of wall materials on encapsulation of phenolic contents in pharmacology.

The last chapter covers the chemical synthesis processes of unique materials (hematite, Ni(II) complex with terephthalate and pyrazine mixed ligands, etc.) with tailored properties for various scientific and industrial uses.

This collection reflects the dynamic nature of material science, offering readers a glimpse into the innovations shaping the future of multiple industries. The presented special edition will be useful to many engineers and researchers in applied materials science.