

Preface

This special publication contains a selection of articles based on research results in applied materials science and diverse materials applications.

The first chapter delves into synthesis techniques, characterisation, and applications of modern polymers, biopolymers and composite materials, which are driving many innovative solutions across sectors such as aerospace, automotive, healthcare, etc.

Chapter 2, Membrane Synthesis, focuses on cutting-edge technologies and methodologies for designing and producing membranes with tailored properties. With their critical role in applications such as water purification, gas separation, energy storage, etc., membranes represent a foundation of sustainable and efficient technological systems. This chapter presents original decisions in synthesis techniques, material selection, and their performance optimisation.

The last third chapter examines the properties and some processing technologies of structural metal materials that underpin modern infrastructure and engineering. A detailed analysis of the mechanical, thermal, and microstructure properties of steels and alloys is presented here. The chapter emphasizes how innovations in metallurgy are enhancing the performance and sustainability of these critical materials.

This special edition aims to provide readers with a deeper understanding of modern material behaviours, their possible applications, and the future of research directions. We hope that this edition will inspire both academic and industrial progress, fostering collaboration and innovation to meet the challenges of the 21st century.