Preface

The special edition immerses the reader in modern materials science and manufacture, offering a comprehensive exploration of modern technologies and methodologies that shape both industrial processes and environmental stewardship. The content is organised into three distinct chapters, each addressing a critical area of current research and the practical use of the obtained results.

The first chapter provides an examination of the mechanical properties of steel welds after flux-cored arc welding and the influence of reinforcing ceramic nanoparticles on the microstructure and hardness of sprayed nichrome coatings.

The second chapter focuses attention on materials engineered for special applications. These materials, ranging from a new nanostructured photoactive composite of black phosphorus and titanium dioxide semiconductors to magnetocaloric materials, are essential for a wide range of emerging technologies. This chapter discusses the properties and multifunctional characteristics of these cutting-edge materials.

Finally, the third chapter addresses one of the most pressing challenges of our time — waste reprocessing and reusing. This chapter explores the potential of biowaste as a resource for producing valuable materials and energy, outlining methods for its effective reuse and recycling.

This special edition provides valuable insights for researchers, engineers, and professionals interested in the intersection of materials science, environmental sustainability, and technological advancement.