Preface

This special edition presents research results focused on materials processing, battery engineering, and thermal engineering—three domains increasingly critical to modern industry and sustainable technological development. By presenting current research results across these fields, the special edition aims to inform engineers, researchers, and students working toward innovative and efficient engineering solutions.

Chapter 1: Friction Stir Welding of Aluminium Alloy.

The first chapter explores friction stir welding (FSW), a solid-state joining technique that has revolutionised the fabrication of lightweight, high-strength structures from aluminium alloys. Emphasis is placed on optimising process parameters, analysing and modelling material flow behaviour, microstructural evolution, and the resulting mechanical properties of welded joints.

Chapter 2: Battery Electrolytes.

Chapter 2 focuses on one of the most vital components in modern electrochemical energy storage systems: the electrolyte. The discussion includes some types of solid electrolytes and explores their role in lithium-ion battery technologies.

Chapter 3: Heat and Mass Transfer in Engineering Systems.

The final chapter addresses heat and mass transfer principles and practical implications in various engineering systems. Covering analysis and modelling of conduction, convection, fluid flow dynamics, thermophysical properties, etc., this chapter offers both theoretical modelling and real-world system design results.

The presented special edition reflects the multidisciplinary and application-driven nature of modern engineering challenges and solutions and will be a useful reference for readers.