

Preface

Titanium and titanium-based materials have long been at the forefront of advanced materials research, owing to their exceptional strength-to-weight ratio, corrosion resistance, and high-temperature performance. Their determinative role in aerospace, automotive, biomedical, and other industrial applications underscores the importance of continuous advancements in titanium-related technologies. This special edition aims to provide a comprehensive overview of recent research results and achievements in three key areas: titanium aluminides, titanium matrix composites, metal injection moulding and sinter-based additive manufacturing.

"Chapter 1: Titanium Aluminides" explores the synthesis and processing techniques, microstructural and mechanical characteristics of titanium aluminides. These intermetallic compounds exhibit excellent high-temperature strength and oxidation resistance, making them prime candidates for use in aerospace turbine components and automotive engine parts.

"Chapter 2: Titanium Matrix Composites" examines the development and properties of titanium matrix composites (TMCs), which integrate ceramic reinforcements into a titanium matrix to achieve superior mechanical properties. The inclusion of reinforcement phases such as silicon carbide or boron enhances stiffness, wear resistance, and thermal stability, making TMCs attractive for high-performance structural applications.

"Chapter 3: Metal Injection Molding and Sinter-Based Additive Manufacturing" presents emerging processing techniques that enable the cost-effective production of complex titanium components. Metal injection moulding (MIM) and sinter-based additive manufacturing (AM) represent innovative powder metallurgy techniques that facilitate near-net shape manufacturing with high material efficiency.

Researchers and engineers will find this special edition useful for understanding the latest advancements and prospects in titanium technology. We hope this edition will serve as a foundation for further technological innovation and expansion of titanium applications in high-performance engineering.