



Preface: lightweight materials

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Received: 20 March 2024

Accepted: 20 March 2024

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The field of materials science is continuously evolving, with researchers and scientists working tirelessly to develop innovative materials that offer unique properties and applications. Lightweight materials have emerged as a particularly important area of focus, with the potential to revolutionize various industries, including aerospace, automotive, and construction.

This special issue of the Journal of Materials Science is dedicated to exploring the latest advances in lightweight materials in China, showcasing cutting-edge research and developments in this exciting field. The 21 papers included in this issue cover a wide range of topics, including the design, synthesis, characterization, and applications of lightweight materials. The topics range from C/Al composites for thermal management to heterostructured metal matrix composites for structural applications. There are ten papers on aluminum alloys, five papers on magnesium alloys, three papers on titanium alloys, one paper on design of heterostructured metal matrix composites, one paper on multi-principal element ceramics and one paper on a

polymer matrix composite. Composite papers include contributions on deformation of TiBw/Ti composites, deformation and fracture of SiC/Al₂O₃ Mg-based composites and additively manufactured Al-matrix composites. Half of the contributions are topical review articles that provide perspective on various issues including additive manufacturing and microstructure design for lightweight materials.

The quest for lightweight materials is driven by the need for energy efficiency, sustainability, and improved performance in various technological applications. From the design and properties of lightweight materials to advanced processing techniques such as additive manufacturing, researchers are applying materials science to create materials that are not only lightweight but also fulfill other design constraints such as strength, corrosion resistance and manufacturability. We expect that the papers in this special issue will inspire and inform researchers and engineers working in the field of lightweight materials. We believe that the insights and innovations presented

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<https://doi.org/10.1007/s10853-024-09601-9>

Published online: 14 May 2024

in this issue will contribute to the advancement of lightweight materials that will benefit a variety of industries.

We would like to express our gratitude to the authors who have contributed their research to this special issue, as well as to the reviewers who have dedicated their time and expertise to ensuring the quality and rigor of the articles. We hope that this

special issue will serve as a valuable resource for anyone interested in the exciting and rapidly evolving field of lightweight materials.

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