Special Issue

Lightweight Alloys

Message from the Guest Editor

Lightweight alloys play a pivotal role in the pursuit of sustainable growth and a net-zero-carbon society by 2050, as they enable the design and manufacture of high-performance, low-weight structures essential for the aerospace, automotive, defense, and electronics industries. These alloys—primarily based on aluminum, magnesium, titanium, and other newly emerging high-entropy alloys—are engineered to provide excellent mechanical properties, a high strength-to-weight ratio, corrosion resistance, and thermal stability while keeping mass to a minimum. Reducing weight without sacrificing performance is critical in high-demand sectors. For example, in aerospace, every kilogram saved can result in significant fuel savings and a reduction in greenhouse gas emissions. Similarly, the automotive industry is focusing on lightweight alloys to improve fuel efficiency and increase the range of electric vehicles (EVs). Lightweight alloys allow designers and engineers to maximize efficiency and minimize their environmental impact, aligning with the sustainability and performance goals in these sectors.

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