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Review on advances in porous Al composites and the possible way forward

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Abstract

Porous aluminum (Al) composites are lightweight and high-strength materials composing of Al as a matrix material with some strengthening reinforcements and pore-forming agents that result in the formation of new material with superior physical properties and energy absorption capacities. This work gives an overview of the porous Al-foams developed thus far, including the foaming agents and space holders, their properties, production techniques, and applications. First, it deliberates the foaming agents and space holders responsible for the foaming and formation of pores in the composites followed by the mechanical properties of the foams. Al has huge potential for applications that require lightweight, high-strength, and high-energy absorption capacity materials, especially in structural construction and automobile manufacturing. Although Al-foams have been successfully used in automobiles for crashworthiness, lightweight structure, and other functional applications, the development of Al foams with enhanced characteristics and properties has limitations. This review discusses various reinforcements used for improving the characteristics of Al-foams. This review also provides an overview of various commercial foams and their contribution to several applications. Finally, it attempts to reveal impediments in foam production with suggested solutions for overcoming the problems in this area. © 2021 The Author(s)

Author keywords

Al-foams; Ceramics; Compressive strength; Energy absorption capacity; Foaming agents; Space-holder technique

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Back to results | 1 of 1

Top of page