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Parveez, B.[a] , Jamal, N.A.[a] , Anuar, H.[a] , Ahmad, Y.[b] , Aabid, A.[c] , Baig, M.[c]

Microstructure and Mechanical Properties of Metal Foams Fabricated via Melt Foaming and Powder Metallurgy Technique: A Review

(2022) *Materials*, 15 (15), art. no. 5302, . Cited 24 times.

DOI: 10.3390/ma15155302

[a] Department of Manufacturing and Materials Engineering, Kulliyyah of Engineering, International Islamic University Malaysia, Kuala Lumpur, 53100, Malaysia
[b] Biotechnology Engineering Department, Kulliyyah of Engineering, International Islamic University Malaysia, Kuala Lumpur, 53100, Malaysia
[c] Department of Engineering Management, College of Engineering, Prince Sultan University, P.O. Box 66833, Riyadh, 11586, Saudi Arabia

Abstract
Metal foams possess remarkable properties, such as lightweight, high compressive strength, lower specific weight, high stiffness, and high energy absorption. These properties make them highly desirable for many engineering applications, including lightweight materials, energy-absorption devices for aerospace and automotive industries, etc. For such potential applications, it is essential to understand the mechanical behaviour of these foams. Producing metal foams is a highly challenging task due to the coexistence of solid, liquid, and gaseous phases at different temperatures. Although numerous techniques are available for producing metal foams, fabricating foamed metal still suffers from imperfections and inconsistencies. Thus, a good understanding of various processing techniques and properties of the resulting foams is essential to improve the foam quality. This review discussed the types of metal foams available in the market and their properties, providing an overview of the production techniques involved and the contribution of metal foams to various applications. This review also discussed the challenges in foam fabrications and proposed several solutions to address these problems. © 2022 by the authors.

Author Keywords
compressive properties; Gibson and Ashby model; mechanical properties; melt foaming; metal foams; powder metallurgy

Index Keywords
Automotive industry, Compressive strength, Energy absorption, Fabrication, Metal foams, Metals, Powder metals; Compressive properties, Engineering applications, Gibson and ashby model, High stiffness, High-energy absorption, Melt foaming, Metal foams, Microstructures and mechanical properties, Powder metallurgy techniques, Property; Powder metallurgy

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Correspondence Address
Jamal N.A.; Department of Manufacturing and Materials Engineering, Malaysia; email: ayuni_jamal@iium.edu.my

Publisher: MDPI

ISSN: 19961944
Language of Original Document: English
Abbreviated Source Title: Mater.
2-s2.0-85137140906
Document Type: Review
Publication Stage: Final
Source: Scopus