

## Processing and Mechanical Properties of Hollow Sphere Aluminum Foams

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### ABSTRACT

Metallic foams exhibit unique combinations of excellent mechanical, thermal, electrical and acoustic properties that provide opportunities for a wide range of applications. Hollow sphere metallic foams are a new class of cellular material that possesses the attractive advantages of uniform cell size distribution and regular cell shape. These result in more predictable physical and mechanical properties than those of cellular materials with a random cell size distribution and irregular cell shapes. In the present study, single aluminum hollow spheres with three kinds of sphere wall thickness as 0.1 mm, 0.3 mm and 0.5 mm were processed by a new pressing method. Hollow sphere aluminum foam samples were prepared by bonding together single hollow spheres with simple cubic packing (SC) and body-centered cubic packing (BCC). Compressive tests were carried out to evaluate the deformation behaviors and mechanical properties of the hollow sphere aluminum foams. Effects of the sphere wall thickness and packing style on the mechanical properties were investigated. Results indicated that the hollow sphere aluminum foams exhibited the typical deformation behaviors of cellular metal materials. The relationship between the relative plateau stress and the relative density of the hollow sphere aluminum foams complies with the power-law that has the exponent  $n$  close to unity.

**Keywords:** Hollow spheres, Aluminum foams, Mechanical properties, Deformation behavior

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