Mechanical properties of martensitic CuZnAl foams in the pseudoelastic regime

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Based on their particular set of properties, cellular metals made from regular alloys have been used for many applications. Cellular metals made from shape memory alloys could widely increase the field of applications. In this work the compressive properties of martensitic CuZnAl foams produced through molten metal infiltration of a leachable bed of silica particles were investigated. During the tests the specimens almost reversibly absorbed deformations up to 4\% (Fig. 1) with excellent shape recovery (typically 95\%). From the metallurgical point of view, the material was prone to intergranular fracture, similar to what is observed in polycrystalline solid samples. Despite its tendency to fracture at localized regions, the obtained cellular shape memory alloy is highly resilient, being able to stand up to 1,000 compression cycles without lack of stability. All that facts (allied to low processing cost) make that foams a very promising candidate for industrial applications.

Keywords: Cellular metals; Functional materials; Shape memory alloys (SMA).

Fig. 1. Compressive behavior of cellular CuZnAl SMA. The first cycle corresponds to the outer curve, reaching up to 4\% compressive deformation. The final deformation was gradually reduced on the following cycles. The arrow points to the onset of stress-induced martensite formation.

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