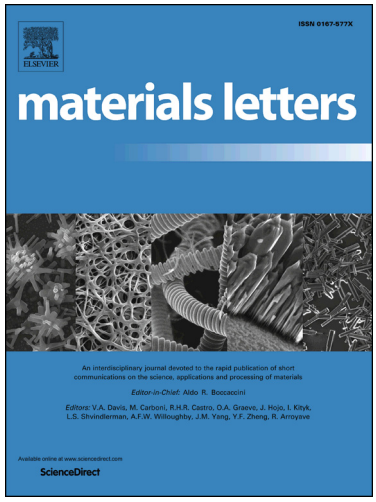

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Fabrication of aluminum foam reinforced by graphene nanoflakes

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Abstract

This paper presents a novel approach for fabricating aluminum foam reinforced by graphene nanoflakes (GNFs) through the direct melt foaming method. With regard to this approach, GNFs coupled with the foaming agent were embedded on the surface of assistant agent via a cryomilling process. Experimental results showed most of GNFs were detected on the pore surface, only slight of GNFs were observed inside pore wall mixing with composite oxides. Besides, slight content of GNFs can significantly improve the pore structures.

Keywords: porous materials, graphene nanoflakes, cryomilling, microstructure

1. Introduction

Aluminum foam is being used in both structural and functional applications owing to the unique combination of excellent properties (*e.g.*, high specific strength, energy absorption abilities, thermal insulation capabilities, and electromagnetic shielding effect). Despite that, many scholars have devoted time and energy to improve the performances of aluminum foam for a preferable application. To date, ex-situ particles, such as SiC [1], TiB_2 [2], Al_2O_3 [3] and fly ash [4], have been employed to improve the mechanical properties of aluminum foam. However, the existence of brittle phases transforms aluminum foam to typical brittle foam. Recently, carbon products, such as carbon fibers [5] and carbon nanotubes [6,7], have been adopted to intensify aluminum foam. Experimental results indicate stability of semi-liquid foam, as well as the compressive property of fabricated aluminum foam, is improved. Graphene nanoflakes (GNFs) as a kind of carbon product attracted the attention of scholars due to their superior properties [8,9]. Latest literatures indicate the ultimate tensile strength coupled with the failure strain of metal matrix